

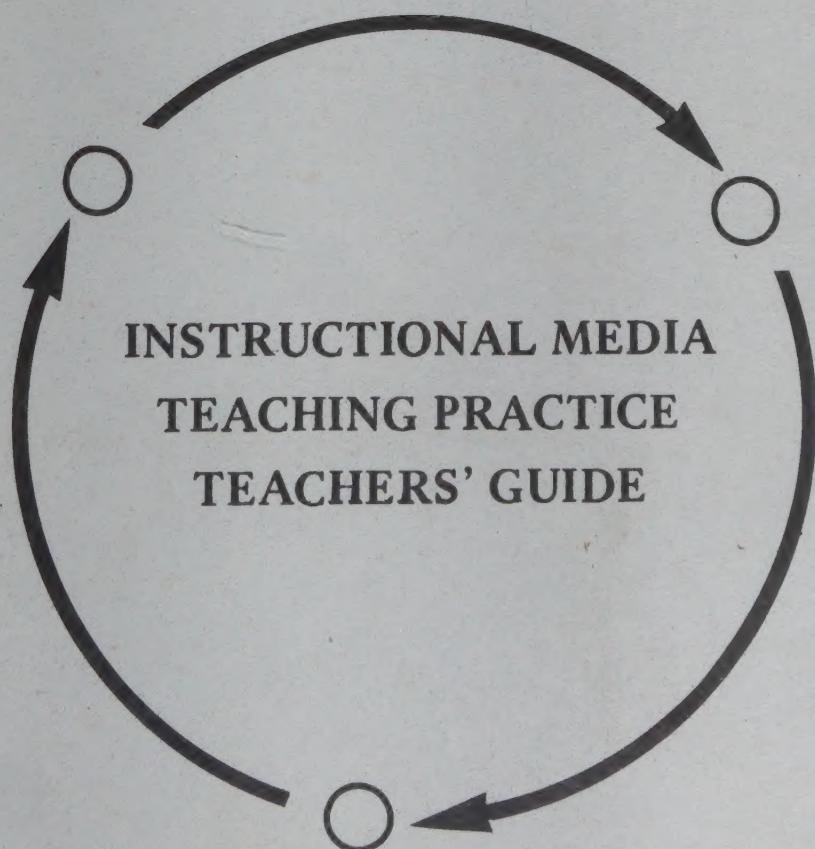
TEACHING SKILLS

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A Manual for Health Trainers

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PART TWO



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TEACHING SKILLS

A MANUAL FOR HEALTH TRAINERS

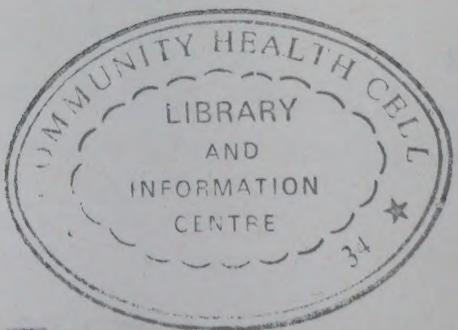
PART TWO

- 4 INSTRUCTIONAL MEDIA
- 5 TEACHING PRACTICE
- 6 TEACHERS GUIDE

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TABLE OF CONTENTS

Preface	
Acknowledgements	
UNIT FOUR: INSTRUCTIONAL RESOURCES	
Objectives	1
Organisation of Unit	3
Reading: The use of Audiovisual Media in Medical teaching.	4
Skill One: Designing and using Visual Media	13
Reading: Designing Illustrations for Teaching	14
Visual Media, Slides and Filmstrips	
Reading: What was that slide about?	23
Exercises	25
Visual Media: Overhead Projection	29
Reading: How to use the overhead projector	29
Exercises	34
Visual Media: Film and TV	37
Reading: How to use prepared TV Material and Films in Medical Education	37
Exercises	42
Reading: Closed Circuit television	45
Visual Media: Microfiche	48
Skill Two: Desgning and using non-projected visual media	49
Visual Media: Non projected Media	50
Taking Photographs	53
Skill Three: Designing and using written materials	55
Reading: How to improve Handouts	56
Reading: Designing Laboratory Exercises	61

Reading: Writing Health Learning Materials	69
Skill Four: <u>Designing and using Audio Media</u>	75
Radio	76
Tape Recorder	76
Skill Five: <u>Using Audio/Visual or multiple media</u>	79
Skill six: <u>Storing and Retrieving Instructional Material</u>	83
Reading: Choosing and using learning resources	87
Bibliography	91
UNIT FIVE: TEACHING PRACTICE	
Objectives	94
Organisation of Teaching Practice	95
Comment on Teaching Practice	96
Reading: Clinical Supervision of Student Teaching	97
Assessment of Teaching	106
Bibliography	116
UNIT SIX: TEACHERS' GUIDE	
UNIT ONE	117
UNIT TWO	119
UNIT THREE	123
UNIT FOUR	125
UNIT FIVE	127
	129

PREFACE

This volume is Part 2 of a manual specifically designed for health trainers from all health disciplines undergoing the course leading to Diploma in Education (Health Professions) at Medical Training Centre, Nairobi, Kenya. Part One covered interaction analysis, microteaching and teaching methods. This part (part 2) covers the use of instructional media, teaching practice and a guide for teachers who are responsible for teaching these units.

In the unit on Instructional Media, there is dual emphasis. One is on the efficient use of the 'hardware' or technology. The other emphasis is on how to use the technology for effective teaching. The health trainers are expected to demonstrate competence in using at least one technique from each major skill area. Selection of one technique allows the trainer to develop an achievable level of competence in the time period, and to select techniques that are appropriate to their normal teaching situation. By requiring trainers to cover each major skill area, it encourages trainers to extend their familiarity with the broad range of instructional media now available without requiring competence in every specific technique. This unit requires plenty of time for trainers to get 'hands - on' experience of the various media. Evaluation formats are (checklists) included to measure performance.

The unit on Teaching Practice is designed to bring the major teaching skills together once trainers have developed initial competence in microteaching skills; teaching methods; the use of instructional media; and the evaluation of student performance. The unit contains minimal material since the success of this unit lies in good planning and good supervision. Evaluation formats in this unit have been field tested over two years and modified appropriately. While I am not entirely satisfied with these formats, I feel that they are necessary and should continue to be used, evaluated and modified where necessary.

Unit Six consists of the Teacher's Guide to the implementation of each unit. It has been included to summarise our experience over three years in running this programme, each time trying to eliminate the negative aspects and trying to consolidate the positive aspects of the experiences. Not only is it useful to clarify guidelines for ourselves, but it has been necessary to develop simple and clear guidelines so that the programme can utilise participants and graduates of the programme to maximum advantage. We are incredibly short of qualified trainers for this programme, but our experience has shown us that with adequate guidance, graduates can be extremely effective facilitators in the course. Course participants too are encouraged, through the provision of adequate guidelines, to initiate their own learning and to provide feedback to their colleagues.

Like Part One, this volume has many faults in it. The user of the manual is encouraged to alter, add to, adapt, and modify the material where necessary.

J. Griffiths

Nairobi 1982.

ACKNOWLEDGEMENTS

Acknowledgements in this section are the same as in part one. Special thanks go to the Australian High Commission in Nairobi for the grant that made this publication possible. Thanks go to the same typists, Beth Nzoka, Priscilla Mwolo, Daphne Backhurst and particularly to Margaret Kyangwa who did such a magnificent job on this section. Graduates of the programme have been one of the most useful sources of evaluation.

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J.M. Griffiths.
MTC, Nairobi. 1982.

U N I T F O U R

I N S T R U C T I O N A L R E S O U R C E S

OBJECTIVES

At the end of this unit students are expected to be able to:

- Use a range of projected and non-projected media effectively in the teaching-learning situation.
- Set up and use a simple storage and retrieval system for instructional resources.
- Design and develop simple teaching aids.
- Evaluate instructional materials in terms of relevance, design, characteristics, cost and effectiveness.
- Introduce or extend the use of instructional media in health training programmes.
- Locate and select instructional media appropriate to the health training programme.

ORGANISATION OF THE UNIT

In this unit there is reading materials and exercises related to a variety of instructional media. Those considered are not exhaustive, but are a range of the resources available from simple to complex, from low to high technology. It is for the teacher to select the appropriate media to master, but it is suggested that the teacher selected at least one medium out of each of the groups of media.

For each skill there are two aspects to master: the technical use of the relevant equipment, and also the effective use of the media as a part of teaching skills. The emphasis on the unit is "hands on" experience and the actual production of useful material.

INTRODUCTION.

Until recently comparatively little use was made of the increasing range of audiovisual media for medical teaching. The situation today, however, is one of universal shortage of teachers combined with a heavy demand for more doctors to meet community requirements for health care. It is necessary, therefore, to consider the part that audiovisual media, properly applied, can play in relieving the teachers' burden and at the same time improving the speed and effectiveness of student learning. Although there is an urgent need for innovation in teaching method, this is not synonymous with the use of extravagant and complicated equipment and audiovisual media must not be considered as an end in themselves. It is necessary rather to consider the place of educational technology within the whole field of educational planning. The task of the teacher is to devise a learning situation which will enable his students to meet the objectives of the course. To this end he must select the most appropriate method of teaching. Whether or not he will use audiovisual media to assist him will depend on many factors. These include the subject, the student level, local facilities available and particularly the teacher's own preference and ability. The communications media, old and new, can help the teacher to illustrate and to improve the impact of his teaching. Yet it is one of the tragedies of particularly the newer media that they have been often used simply to perpetuate poor teaching methods. The proper use of these media demands understanding, skill and practice exactly as in any other technique. Each method has its advantages and limitations and its particular indications in certain areas of learning. If he is to use them properly, the teacher must be aware of all these factors; he must be able to decide whether or not an audiovisual aid will help student learning in a particular situation. If the answer is no then an aid should not be used. There is all too often a tendency to use audiovisual materials simply because they are available. This is the reverse of proper teaching practice and is partly responsible for the frequent abuse of audiovisual media today which brings them into undeserved disrepute.

This article is intended to provide a brief review of the role which the communications media can play in the teaching of medicine. A carefully selected bibliography provides useful additional reading material for developing further the theme.

SIMPLE VISUAL AIDS NOT REQUIRING PROJECTION.

No article on visual aids can afford to omit reference to the blackboard (or chalk board as it is often called today in view of its many colours). This is the most widely used of all visual media and has

¹ Dowling, M.A.C.

considerable impact on the learner. In the field of medical pedagogy, it is normally assumed that a teacher is also an expert in his vocation, and therefore knows how to use the blackboard. In fact there is a good deal of technique which can be learned to ensure that this visual aid is properly used. There is an excellent short description of blackboard technique in "Teaching and Learning in Medical Schools" (Miller, 1962; 158 - 164).

Other visual aids which come into this category include models and charts which in general are used more in auxiliary training than in medical schools. Both can, however, serve a useful purpose if they are used with imagination. Charts in practice are best prepared locally as they can then reflect the method and train of thought of the individual teacher. Models present more difficulty and are frequently very expensive, especially the more complex ones which allow students to practise techniques before applying them to living patients.

In many medical faculties, much use is made of wall board displays for teaching and revision. An appropriate subject is selected and a display sequence prepared with text, tables, graphs, photographs, pathological materials, etc. The display is then set up in a place where students can study it at their leisure following the sequence at their own rate and making notes as required. This is a useful teaching method as long as it organises material clearly and concisely (which the text book often does not do) and contains the most recent information available. An important proviso, however, is that displays of this type should be frequently changed. There is little more discouraging than a dusty old series of exhibits which have outlived their usefulness.

SIMPLE VISUAL AIDS REQUIRING PROJECTION.

A technique which is being increasingly used in medical schools and which rivals the blackboard in its usefulness is overhead projection. This essentially simple device has in fact certain direct advantages over the blackboard. The teacher is able to face his class while using the projector which, unlike the rest of the front projection techniques, can be used in normal daylight. In this way he is able to maintain direct contact with his students, a process difficult to achieve when he is writing on the blackboard or when the room is darkened. In addition to normal writing on transparent acetate during the class, simple or complicated transparencies can be prepared in advance and can be kept for future teaching sessions. Any teacher who has carefully prepared a detailed drawing on the blackboard has experienced the frustration and sense of wasted effort when his handiwork is effaced. Transparent models can also be used to demonstrate difficult or complex movement by means of the overhead projector. Ideally, the teacher should also have simple equipment and materials for preparation of his own transparencies. The use of heat sensitive copiers (e.g. the single process 3M Secretary or the dual spectrum process, the dry copier) will greatly simplify his task and additional colour can be added afterwards to give emphasis as required. There are many

excellent and relatively inexpensive projectors on the market and as long as a good screen is used and the "keystone" effect is countered by screen tilt, a vivid picture can easily be obtained even in broadest daylight.

All other methods of projection from the front require dimmed lights. The epidiascope normally requires complete darkness in order to give a sharp picture. It has in general a relatively short throw and is much less used than formerly. It can, however, be very useful for direct projection of illustrations from books or plates, or for making charts.

Filmstrips have certain definite advantages over separate slides. As long as enough copies are needed (e.g. more than 20), filmstrips are considerably cheaper than slides. A strip, for example, with 80 frames in colour will cost as little as \$1.50 to prepare as compared to a minimum of \$4. for the same number of separate slides. As long as sequence is important, the filmstrip has the great advantage that the frames are always in the correct order and the right way up. There is no possibility of error once the strip is properly inserted in the projector. If a very large number of slide series are to be stored as, for example, in a programmed courses library where audiotape is linked with visuals, the filmstrip takes up far less space than the slide series. In medical instruction, however, it is not common that a full series of frames is required on every occasion. More frequently, the teacher prefers to make a selection beforehand and to adjust the order of showing in order to fit his own theme. In such an event, a set of slides has a considerable advantage over the filmstrip. It should also be noted that filmstrip projectors must match the frame arrangement on the strip. Different producers of filmstrips make use of either half or full frame and the sequence runs either vertical or horizontally. The equipment should be compatible with the teaching materials to improve efficiency and control by the teacher, remote control and focussing should be at his disposal.

The most commonly used projectable teaching materials used in medical education is undoubtedly the projection slide, usually in 35mm form (2 x 2 slides). As with all visuals, the slide must make an immediate impact on the viewer as it is usually on the screen for a brief period only. A common practice is to make slides directly from tables or charts in published articles. The situation of a reader is quite different from that of a viewer. The former has plenty of time to study and understand even a complex diagram in an article. However, the same does not apply when it is flashed upon the screen, and it is frequently incomprehensible due to small lettering, or too many details. If, therefore, it represents a table or a chart, it must be reduced to its simplest form so that it is immediately understandable. If there are too many materials and therefore they cannot be condensed into the form of a visual, it is probably better to distribute them as a handout. As long as these points are borne in mind, a slide can be a valuable adjunct to a talk.

Many faculties have departments of medical photography or illustration which can make professional slides for the teaching staff. However, many teachers like to make their own and for this purpose the Kodak Ektagraphic

Visualmaker costing about \$100.- represents a simple and effective means of making colour slides from articles, books, charts, etc. The quality of Reproduction is excellent and the cost of each individual slide (taking into account film and flash) is in the neighbourhood of \$0.15 to \$0.20. If single, immediate slides are required, the Polaroid MP3 Industrial View Camera with Type 146/L high contrast film can be used. This makes good black and white slides ready for projection in less than a minute. Such slides come in the format 3.1/4" x 4" so - if it is intended to cut them down to standard 35mm slides - allowance for borders must be made in photography.

There are many excellent slide projectors on the market such as the Kodak Carousel S, which is widely used and which is equipped with remote control as well as with adaptor for preparing synchronized tape/slide programmes. It should be remembered that it is possible to use slides or filmstrip in association with audiotape to simulate a problem or to initiate a discussion. The visual impact produces better student involvement than a spoken or written problem. As compared with a film, the audiotape/slide problem is remarkably cheap and can cost as little as \$3.- for a 20 frame sequence.

FILM PROJECTION.

Films in 16 mm format have been for a long time a standard part of the work programme in many faculties. The film with its synchronized sound and movement can bring a student into close contact with a real-life situation. That this teaching aid has not been used more often has been due to several factors. A 16 mm film is costly to produce; copies especially in colour are expensive and are easily damaged in transit and handling. The majority of films have been prepared without a clear teaching objective and without the advice and guidance of an experienced teacher. As a result, they are over-long and contain many irrelevancies. Often films are shown during a course not so much for their teaching value as to make a break in the programme. Well-made teaching films on medical subjects are scarce and it is imperative that the teacher views each film before showing it to his students. When only a portion of the film is relevant, only this section should be shown - it is not necessary for students to endure the whole of a 25 minute film for the sake of 5 minutes of relevant matter. The threading of film and handing of projection equipment without skilled technicians leads to frequent breakdowns and film damage which cause frustration to teacher and student alike. To these difficulties must be added the absence of good catalogues to enable a teacher to assess the suitability of a film for his own particular requirements, and also the virtual impossibility of obtaining copies of films for preview in developing countries. As purchase on spec. is a risky and expensive business, it is easy to see why films have not played as important a role in medical teaching as their potential deserves.

In an attempt to solve this problem, the idea of the "single concept" film was developed. This, a producer's nightmare, is a short film with a single clear teaching objective without padding or irrelevancies. The new

super-8 mm film has lent itself particularly well to this single concept development as it is relatively cheap and easy to produce. However, the 8 mm film has the disadvantage that it has only a relatively short throw and cannot, up to now, be adapted to showing from a projection room at the back of a large classroom. Much of this disadvantage has been offset by the introduction of "loop films". These are continuous loops of super-8 film in cassettes adapted to rear projection viewing screens similar to television receivers. Until recently there was little point in health teaching institutes buying a loop film projector such as the Technicolor 610 as there was insufficient teaching material available in cassette to justify its purchase. However, there has recently been an increasing number of loop film series accompanied by teaching texts. These make excellent learning material especially adapted to individual and small group instruction and to revision. Such series include "Nursing Skills and Techniques" (a set of 126 loops together with a teaching manual developed by Delta College, Michigan) and a large series of well over 200 loops on clinical examination and clinical syndromes prepared by Gaigy with accompanying texts and manuals. These are all silent loops requiring no threading and can be adapted to many different forms of teaching approach.

In addition to the silent loops, super-8 mm film sound loops have also been introduced. These have the same potential disadvantages as the 16 mm sound film unless they are carefully prepared with clear teaching objectives. These sound loops are increasingly used as part of multi-media teaching programmes where they play the role of synthesis of material which has been previously learned by the use of slides, audiotape or text.

PROGRAMMED COURSES.

A field in which audiovisual aids may be a major factor in helping to offset teaching staff shortage in developing countries is in the use of programmed courses. These courses consist of texts or audiotape combined with a variety of illustrations (e.g. filmstrip, slides, loop film etc.) They are being used increasingly for individual and small group study and are based on the principles of programmed learning. The student is able to work at his own rate on a logically developed, sequential course aimed at helping him to attain a specific objective or set of objectives.

Programmed learning itself in text or teaching machine format has made comparatively little impact on medical teaching. This is due at least in part to the difficulties inherent in the preparation of a good specific programme which, with its highly specific objectives, is appropriate only for a particular student group. Difficulties in translation, differences in student level and experience, and expense have together restricted the use of the relatively few programmes on the market. Evaluation of programmes as compared to conventional methods of teaching shows that the programme can at least hold with its own and in many cases (particularly with the lower half of the class) can give better results than the conventional method. Comparisons between programmes in text format and in association

with teaching machines have revealed little or no difference between the two learning procedures. As teaching machines are expensive and require frequent maintenance, there is at present therefore little justification for their use when a good text is available. Information on existing programmed learning courses in the medical field can be obtained from the Clearing-house on Self-instructional Materials for Health Care Facilities, University of Rochester, Rochester, New York 14627; the School of Education, The University, Birmingham B15 2TT; or (for programmes in the French language) Centre de Documentation sur l'Enseignement Programmé, Institut Pédagogique National, 29 rue d'Ulm, Paris V.

For undergraduate medical education, many faculties have begun the production of programmed courses using combined audiotape and slides or audiotape and text. For example, the medical faculty at Rotterdam has recently developed a programmed course on general pathology for second and third year students. This involved the preparation of some 70 twenty-minute sessions on audiotape, each illustrated with drawings, microphotographs and colour slides. The student works through the series at a time and pace to suit his own needs. The course was so devised as to incorporate student participation and self-testing. Once prepared, it was tried out on student groups and modified accordingly, and has since enabled large numbers of students to learn the fundamentals of the subject. At the same time, the teaching staff has been freed to devote themselves to more individualised tuition of students. They were able to promote discussion groups and seminars for which no time was available when the traditional methods of instruction were used. There are many examples of such courses - for instance, McMaster University in Canada lists almost 300 in their 1970 catalogue. The quality, however, is very variable ranging from a taped lecture to a properly validated sequential programme. In this context, it is worth drawing attention to the work of Dr. R. McG. Harden and his team in the University of Glasgow, who view the tape/slide programme as a medium in its own right. It must be developed by a medical editor in sequential steps with frequent student participation and testing just like any unit of programmed learning.

The way in which these tape/slide programmes is presented to individual students varies from simple to very sophisticated. For example, materials can be presented in written text, associated with projection slides seen in a hand-viewer. In more sophisticated form, the text can be replaced by audiotape and the slides shown automatically synchronised with the sound track. An electronic student response box can even form part of the programme unit to ensure better student participation at the same time maintaining a record of his progress. The degree of sophistication of the process, however, will depend on the availability locally of equipment and maintenance facilities. Students work in study carrels which need only be booths of simple construction containing equipment for play-back and for projection. These booths can be set close to one another as students make use of earphones when listening to the audiotape.

It is likely that recent developments in television in which the audiovisual medium is presented in the form of cassette or record will also play an important part in continuing education. Examples are EVR

which may well increase its value for undergraduate teaching, is its capacity for storage of information. The player can preselect any one of 180 000 different frames contained in a thirty-minute cassette. As each frame, which can be held for as long as required on the television screen, can contain up to 100 words, the possibility of storage and reproduction of teaching material is immense.

There has unfortunately been all too little evaluation of the many programmed courses in use for undergraduate and continuing education. An appropriate assessment of such materials, against strict criteria and with different student groups, may point the way towards improvement in programme quality in the future.

DESIGN OF LEARNING SPACES.

The increasing use of audiovisual media has of necessity been reflected in the design of new classrooms and lecture halls. Included in the design is a projection room where all audiovisuals required can be set up in advance by a technician, while the teacher operates a remote control system from his desk. There are also advantages to the use of rear projection, as the brighter picture on the screen can be clearly seen by the student group without need for black-out. Even in old classrooms, careful attention to lighting, to the position of student seating, and to the type and quality of screen can greatly improve the quality of visuals. The design of study carrels for individual learning is well covered in *Studdy Carrels* (1964). The tendency today is to involve the library in the storage of audiovisuals, programmed courses, etc. as this is an organization well adapted to such storage, retrieval and issue.

In many faculties, audiovisual media are being used for evaluation of student performance. The "feed-back classroom" is an extension of this concept. Each student in the room is provided with a response box for press-button selection of reply to multiple-choice questions. The teacher is able to see at a glance on a central panel what proportion of the group has understood the subject under discussion. He can decide whether or not he needs to repeat a section so that it is properly grasped. At the same time his attention is drawn to those members of the class who are having real difficulty and may require individual tuition. A good description of the design and application of this type of continual evaluation of both teacher and student performance is given in "The Feed-back Classroom" (Media and Methods 1969).

TRAINING OF STAFF.

Mention has already been made of the need for training of teaching staff in teaching methods as part of the overall programme of teacher training. However, if the application of all the audiovisual media in medical teaching is to be fully effective, a well trained technical staff is required for the production of material and for the operation and maintenance of equipment. Many faculties and institutes

in developing countries are meeting this need by setting up departments of medical photography or medical illustration. In certain countries there are now established courses and recognized diplomas for audiovisual technicians, medical photographers and medical and biological illustrators. This training is either carried out at a specialized schools or through apprenticeship. Several faculties with established departments of medical illustration, television, etc. are prepared to accept trainees. These then have the opportunity of learning on the job in properly organized departments under constant supervision.

CONCLUSION.

It is once again stressed that audiovisual media should not be used indiscriminately but rather to meet specific, well-defined objectives within the teaching programme. This underlines the need for teachers to know the capabilities and limitations of all the many varieties of media which are available today and to develop skills in their correct use. Only in this way will the new communications media begin to realise their immense potential in facilitating student learning.

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SUMMARY OF INSTRUCTIONAL MEDIA

Visual	Projected (1)	Microfiche Slides Filmstrip Television O.H.P. Film
	Non Projected (2)	Photographs Posters Wallcharts Flipcharts Boards Chalkboards Models
Written (3)		Handouts Manuals Programmed material
Audio (4)		Tape recordings Radio
Multiple Media (5)		Computer-assisted instruction video Slide/tapes Film Television

S K I L L O N E

D E S I G N I N G A N D U S I N G V I S U A L M E D I A

Much of that we teach in medical education is visual information. Students must learn to recognize and discriminate among a complex variety of clinical signs and entities, many of which are visible.

While teachers devote considerable effort to the ways in which they teach verbal information, they seldom devote the same attention to the design or composition of the illustrations they use. This is probably because they have few rules to go by. In learning a language we learn certain rules which ensure that the things we say are understood by our audience. For example, in the English language a sentence must contain certain categories of words such as verbs and nouns in order for it to have any meaning. In comparison, the grammar of visual language is not yet widely understood.

This chapter contains a summary of some of the existing rules for communicating through pictures which have been derived from research. A classification of illustration type is suggested and answers to some of the most commonly asked questions are provided. Particular attention is paid to communication in cross-cultural contexts since teachers in the health professions are often required to provide information and training to groups whose educational, social and cultural backgrounds are quite different from their own.

CLASSIFICATION OF ILLUSTRATION TYPES.

Illustrations may be classified in a number of ways depending upon our purposes. When considering illustrations for teaching, the most useful classification rests upon how the picture is used to represent some information in order to make learning of that information easier. Some illustrations depict real objects and events by portraying them as realistically as possible, for example, a photograph, while others portray them more schematically, for example, a cartoon or diagram. It is necessary to make decisions about the type of illustration best suited to the instructional task.

The basic components of an illustration, like the basic components of a sentence, can be identified. Those components are the elements which can be altered in order to change the meaning and therefore the information transmitted by the illustration. The elements are:

colour

movement

size

Alteration of each of these elements affects the learning of the

information presented by the illustration.

A basis for classification, then, is the extent to which each of these elements matches the corresponding element in the object which the illustration is intended to represent. If all elements are faithfully reproduced then the illustration can be classified as realistic; as the number of elements which differ from the real elements increases, then the degree of reality of the illustration will decrease. Maximum divergence from representation of the realistic can be called schematic.

All illustrations, even the most realistic colour photography, are to some extent man-made and as such have a subjective quality about them. Even in the act of taking a photograph the photographer chooses a lens, filter, camera angle and framing. The viewer of any illustration is always at least once removed from the object it represents. The problem is compounded, however, when the illustration is less realistic and more schematic. In schematic representations we rely more heavily on the graphic artist's interpretation and rendering of the subject, and then again on our own interpretation of that representation.

An extreme example to clarify this point is the use of language. A written word is a visual representation of an object. It is, however, completely symbolic. The word 'dog', the reader must know the rules that govern the use of that symbol, that is, the alphabets, spelling, and the meaning of the word. Similarly, a learner faced with a diagrammatic picture must be aware of certain rules which govern the form it takes; for example, a black line usually demotes an edge or boundary, and various other conventions, such as shading and angulation, denote distance or depth. Scientific disciplines have many such conventions for representation, for example, symbols used in chemistry or physics.

The aim of illustrations used in teaching is to share meaning. Meaning can be shared only if the rules for interpretation of the illustration are shared; in other words the students as well as the teacher must understand the symbols used and know what they represent.

The first question one might ask then is:

How realistic or schematic should the illustration be?

The three main functions of an illustration are:

1. To substitute for, or replace experience
2. To dramatize or exaggerate experience
3. To clarify or explain experience

Common sense and research results (Arnold and Dwyer, 1975) indicate that realistic illustrations are more appropriate for function one, schematic for function three.

Firm guidelines for the exact amount of realism or detail do not yet exist, although a number of generalizations can be made which provide

a rational basis for choice and decision:

1. Simple line drawings reduce the amount of information which must be perceived and processed. Therefore, when the verbal information accompanying the illustration is complex and carries most of the message (usually the case in lectures) simple illustrations may reduce the information processing load on the central nervous system (Spitz and Borland, 1971).
2. Simple illustrations are more effective than complex illustrations when viewing time is short as, for example, in a lecture (Fleming and Sheikhian, 1972).
3. Simple illustrations are more appropriate when the objectives of the instruction require understanding of the overall nature of the object rather than its detailed appearance
4. Illustrations which contain greater detail are more effective when the rate of instruction is controlled by the learner (Dwyer, 1970).
5. Illustrations which are schematic must use conventional symbols with which the learners are familiar.

If simple schematic illustrations have a specific set of functions to perform, primarily that of clarifying or explaining visual information, the next question is:

Which elements in the illustration should be varied from reality and for what purpose?

Taking each of the principal elements in turn, an examination of available evidence on their usefulness provides some guidelines to follow.

ILLUSTRATION CONTENT.

In general, extraneous detail should be eliminated in order to avoid distraction from the crucial aspects of the illustration. Elimination of unnecessary detail can be achieved by selective framing when taking a photograph or by cropping or masking an existing photograph. Sometimes diagrams and graphs taken from other sources have to be redrawn so that the aspects with which the instruction is particularly concerned will be outstanding.

Arrows and labelling devices increase learning if they are used only to draw attention to relevant and critical content within the illustration (Fleming and Sheikhian, 1972).

Other cues in the illustration which contribute to its meaning are dependent upon early learning and experience. Depth is usually represented by the use of perspective. When we realize that perspective

When we realize that perspective is a convention which became incorporated into European painting as late as the Renaissance, it becomes obvious that the ability to interpret such uses is by no means universal. People who have grown up in an environment which is devoid of the opportunity to learn such cues will be at a loss in interpreting illustrations whose meaning rests on them. Such differences may also exist between groups within a single culture; for example, the chemists' model of a molecule is a clear representation to them but may, to the layman, appear to be only a random collection of balls and sticks.

An important guideline is determining content and composition of the illustration is never to take for granted the ability of the viewer to understand what it is you have tried to say visually. Does the viewer share your conventions? Can the viewer 'read' your illustration? Often the only effective way to answer these questions is by trying the illustrations out with a viewer whose experience is similar to that of the students for whom the illustration is intended.

COLOUR.

Research (Rudnick et al, 1973) has shown that:

The use of colour frequently does not contribute to learning.

Colour may be useful when it is used to emphasize learning cues. For example, if a film were to be produced to demonstrate a surgical technique, colour would be required to provide optimal definition of anatomical structures such as arteries and veins.

Colour can serve as a distractor from other important cues when used indiscriminately.

Learners generally prefer colour.

Viewer's emotions are affected by colour (Scanlon, 1970). For example, a film designed to modify attitudes to an emotive topic such as drug abuse may be more effective if presented in colour. A purely factual presentation such as a televised Physics lesson may be more effective in black and white, since there will be less competition between the sound track and the monochrome visual than there would be if a coloured visual were used.

The case for using coloured illustrations is not as clearcut as it would seem. The potential benefits of a coloured illustration must be weighed against the potential of the coloured visual to distract the viewer from the central message of the illustration.

MOVEMENT.

Obviously, in learning any manipulative skill students will benefit from a demonstration either in reality or using a motion medium. Remember, you can exploit the capabilities of the medium by using special effects,

such as slow motion or instant replay to demonstrate components of the skill. Concepts involving time lapse, such as the growth of a skin lesion or the resolution of visible signs after treatment, are best presented by a medium which allows continuous sequential presentation which simulates movement, rather than a static sequence of illustrations such as appear on a printed page. Filmstrip is particularly useful for this effect, which conveys the dynamics of change rather than movement itself (Wells et al, 1973).

SIZE

Trained visual designers are aware that certain areas in an illustration will be fixated by the eye more frequently than other areas. Such areas are called the centre of interest and result from the arrangement of various elements of the picture. A bright object or a large object will attract most attention. Since the eye scans the illustration to identify these key elements, it is likely that a large illustration will require more time for scanning and will therefore be a more time-consuming task. Similarly, a small image may require more time for scanning and visual discrimination because of the closeness of its elements to each other.

Another aspect of size is scale. Scale allows large amounts of information to be compressed into a small space. Scale is learned. When using illustrations which are scaled either large or smaller than life size, it is very important for the teacher to teach students the measuring system used or to make the scale explicit. For example, a film or slide which makes use of close-up or magnified image for the purpose of illustrating detail should include within the frame some background object or material whose size is known in order to provide a point of comparison. In the case of clinical photographs this may be simply done by including a small measuring scale or, in a photograph of an operating field for example, by including an instrument or part of the surgeon's hand in the field of vision.

In answering the question *which elements in the illustration should be varied from reality and for what purpose?* We have looked at those aspects of the illustration which may be altered in order to increase the comprehension of the student and to facilitate learning. Design principles and media characteristics allow the teacher to surpass reality and enrich the students' experiences. The teacher's imagination, common sense and sensitivity to the nature of visual experience are important tools in the improvement of visual aspects of instruction. But what of the student? The learner is not merely a passive recipient; he or she must interpret the material seen and convert it into meaningful learning for later use.

This brings us to the next important question:

Are there individual differences in the ability to learn from illustrations?

The answer to this question is definitely 'yes'. Unfortunately little progress has been made in determining exactly which types of illustrations are most effective for people with particular abilities or backgrounds. Variation among individuals and the host of educational factors which determine the effectiveness of illustrations, make any definitive prescriptions impossible. A few examples of what is known in this field will illustrate the complexity of the situation.

INTELLIGENCE

General intellectual ability has been shown to be directly correlated with the ability to learn from illustrations. Army trainees with low I.Q.s learned more from coloured instructional videotapes than high ability trainees. Conversely, the latter learned more from a black and white version (Kanner and Rosenstein, 1960).

It has been suggested that more intelligent subjects, because of their superior ability for processing and interpreting stimuli, should be offered learning materials which have complex and rapidly changing pictures (Allen, 1975). Since medical students are usually of high intelligence this recommendation is relevant to the design of teaching materials in medical education.

BACKGROUND EXPERIENCE

Perception is also influenced by environment (Mangan, 1978). Cree Indians from Canada and Zulus from South Africa respond to linear illustrations differently from most Europeans, probably because they live in round dwellings and experience a spherical rather than a 'carpentered' environment. At a more conceptual level, even if a viewer has correctly interpreted the visual image, there is a reasonable chance that any symbolic meaning will be missed or misinterpreted by a viewer whose concepts derive from a different life experience from that of the teacher. A health educator from Guyana recounted her efforts to use a poster to alert villagers to the benefits of immunization. The poster showed two smiling children under an umbrella, symbol of protection. The villagers interpreted the message as an advertisement for umbrellas and the virtues of staying out of the rain!

Mangan provided guidelines for the design of clearer, more effective images in cross-cultural or subcultural communication:

1. Examine the objects, practices, symbols or concepts which are to be depicted.
2. Examine the target population for whose use the educational materials are intended.
3. Wherever possible select indigenous forms of visual images, or design new images with the help of members of the target group.

4. Construct sample visual materials.
5. Test visual materials with a sample of the population to find out whether they interpret the materials accurately.
6. Adjust materials according to test results.
7. Test refined materials.
8. Teach the target population the meaning of images that continue to pose problems of visual interpretation.
9. If this fails, reconsider the original strategy.

CONCLUSION

Illustrations are an important aid to learning because information stored in the brain in the form of images is believed to be more amenable to later retrieval than is information stored in verbal form. A number of factors should be borne in mind when designing and using illustrations for teaching.

The nature of the learning task

Illustrations are effective in those tasks which require recall of visual information.

In practice if students are required to recognize something, it must be illustrated for them unless the real example is available. Verbal explanation will suffice for comprehension of a concept but not for recognition of the concept.

The function of the illustration

If visual materials are intended to enable students to recognize conditions, they must represent the real situation as closely as possible.

If visual materials are aimed at increasing the students' understanding they should be designed in order to simplify and clarify the concept and need not resemble its real appearance. Accompanying verbal commentary should carry the majority of the information. Illustrations should complement the verbal message.

If visual materials are intended to affect attitudes and emotions, they will be more effective if they portray real situations in colour via a medium, such as television or film, which closely simulates reality.

If they are intended to demonstrate a skill or technique, they will be most effective if portrayed via a motion medium, using a camera placement which simulates the position of the observer as closely as possible. Slow motion or insertion of still shots will aid comprehension of component skills.

Basic design principles

When information is presented via two channels, for example, visual and auditory, care should be taken to avoid interference between the two. Information presented in one channel must be directly relevant to that presented in the other. Visual presentations attract more attention than verbal. If the content of each is not identical or directly related, information loss will occur, probably from the verbal presentation (Mowbray, 1953).

Labelling should be minimal. Arrows within an illustration may be useful but less effective than the use of a pointer by the instructor. Illustrations in self-instructional programs will require internal arrows and labelling if there is a need to eliminate ambiguity.

Colour should be used only to emphasize learning cues or to increase the similarity of illustrations to the objects or situations they represent. Colour may act as a distractor.

Presentation method

Complex illustrations should be displayed long enough to allow processing and interpretation of the information. Simplified illustrations with low information content can be processed effectively in shorter times and are therefore suitable for use in lectures. When pace of presentation is controlled by the learner this consideration becomes less critical.

In some cases rough chalkboard drawings might convey more information than the meticulous work of a professional illustrator, provided the teacher has a clear idea of the function and limitations of the illustration.

The target group

Pictures are not a universal language. Conventions for representation physically and symbolically differ widely. Ability to interpret visual presentations which incorporate these conventions is learned and comes from influences in the environment, the social, educational and cultural background of the group. The teacher's task is to share ideas and knowledge; this can be achieved with the aid of illustrations only if the teacher has trouble to become familiar with the visual experience and skills and the symbol system of the group. Field testing of visual materials, however modest, is mandatory.

Illustrations for use in teaching need not have artistic merit, but they must have instructional value. There must be no doubt that they convey the desired message in a manner which can be readily received and accurately interpreted. If a teacher is unable to justify on these grounds the choice of a particular illustration for a particular group and a particular learning task, then he or she is in danger of using it inappropriately.

* * * * *

WHAT WAS THE SLIDE ABOUT?

R. BANDARANYAKE¹

How often have you sat at the rear of a darkened auditorium and strained your eyes trying to decipher what some learned speaker was attempting to show on the screen with a 35 mm slide? How often have you seen that learned speaker, probably unaware that you were creating the same problem for a section of the audience unfortunately occupying the rear seats of the auditorium? How often have you heard a speaker say, 'You probably can't see this from where you are seated, so I will read it out to you'? One of the surest ways of losing the attention of an audience during a presentation is by projecting material which is illegible for even a section of the audience.

The majority of illegible slides that are projected are due, not so much to poor photography, but to careless preparation of the material that is photographed. Following a few simple guidelines in such preparation will considerably enhance the quality of one's presentation. This chapter sets out to suggest such guidelines.

THE PHYSICAL SETTING

Whenever possible the physical setting in which the presentation is to be made should be checked out before preparing the slides. In preparing original artwork for photography, a good rule to follow is to tailor the audio-visual material to that section of the audience in the rear seats. It is useful to remember that the maximum viewing distance is approximately eight times the height of the projected image. Most projection screens are of the 'horizontal' type, i.e. the horizontal axis is longer than the vertical. Accordingly, slides too should be of the horizontal type. If, however, the screen is vertical the slides should be prepared accordingly.

ARTWORK DIMENSIONS

To achieve maximum usage of the image area it is necessary to retain the same 3:2 proportion in the original artwork as in the 35 mm slide. Although it is easier to photograph directly from a book, it may be necessary to redraw a graph in order to attain the required 3:2 proportion. This could mean extending one axis in relation to the other.

Partial coverage of the projected image by slide masks, camera frames etc. can be avoided by leaving a sufficiently wide margin on each of the four sides of the artwork. Even so the image should not be allowed to extend to the very margins of the projected area.

¹From Cox, K and Ewan, C. The Medical Teacher, Churchill Livingstone, 1981, 35 - 137.

CONTENT

One of the most important, yet often ignored, rules is to limit each slide to just one central idea. Overcrowding the slide with words and figures should be avoided. A common mistake is to include material which is not referred to by the speaker at all. The speaker who says,

I want you to concentrate on this area and ignore the rest of the slide" could have done better without the "rest of the slide". Unless a comparison is to be made each graph should not have more than one curve. If several curves are essential using a different colour for each whenever possible is helpful. Excessive notes and explanations which can be communicated orally are better omitted from the slide.

LETTERING

The minimum letter height for legibility on a 35 mm slide is 0.5 mm. With this in mind the minimum letter height on the original artwork can be calculated according to the size of the latter. Bold and simple letters, rather than fancy, condensed or expanded letters, should be used. When it is necessary to extend the line of lettering, this is better achieved by increasing the spaces between letters than by expanding the letters themselves. It should be remembered that the reduction in size with photography affects thickness of lines as well as length. If very small spaces are left within or between letters they usually fill up when projected.

GRAPH COMPONENTS

Graph components can be relatively emphasized by varying letter height and line thickness. A suggested order of decreasing emphasis is: curves and symbols, axes, axis captions, grid markers, key or legend. Additional emphasis can also be achieved by using colours.

CONTRAST

All material presented should contrast adequately with the background. Soft tones tend to fade when reproduced, and legibility is affected. The colours used should be strong and attractive. It is necessary to avoid heavily saturated colours (e.g. deep green or brown) as background. The following combinations of colours are recommended: black on white or yellow; blue, green or red on white; white or orange on blue. Those that should be avoided are: black on blue or brown; white on yellow, and yellow on white; green on grey or blue, and blue on green or grey.

Remember that the slide should be a visual stimulus which is additional to the auditory stimulus emanating from the speaker. If one or the other is too distracting or incomprehensible, the audience could miss both in trying to follow one.

.....

GUIDELINES TO PREPARING AND USING SLIDES

The use of slides is preferable to filmstrips since they are more easily edited and kept up to date. When making a set of slides you should consider the following procedure:

1. Decide on the subject.
2. Write down a preliminary commentary or major teaching points (this is known as a story board).
3. Make a list of the pictures you will need to take.
4. Photograph the scenes.
5. Process the film.
6. Arrange the slides in the correct order.
7. Review the set with a colleague and make necessary alterations.
8. Pack the slides safely along with the notes to accompany the slides.

When screening slides, you must ensure:

1. Good seating and screening arrangements.
2. You select good slides.
3. You show not too many slides and provide adequate time and commentary for viewing.

EXERCISE 1

* * * * *

Develop a review guide based on Farrants ABC guide to a good visual aid. (Farrant, 1981; 298). Apply it to a set of slides and decide whether you should be using it for teaching purposes, or does it need adaptations?

EXERCISE 2

Become proficient to the operational tasks of using a slide projector. These will include:

1. Setting up the machine.
2. Inserting slides to get correct projection.
3. Focusing the image.

4. Changing the bulb.
5. Arranging seating and screen.

EXERCISE 3

Teach a class using slides.

When showing slides allow plenty of time for the students to view the slide; make sure each slide is clearly projected; point out the significant details on the slide.

EXERCISE 4

Develop a slide set. The following steps should be followed:

1. Decide topic and major concepts to be illustrated.
2. Compose a story board which indicates major features of each slide and their sequence.
3. Do any necessary graphic work.
4. Take the appropriate photos and arrange processing.
5. Put the slides into the correct order.
6. Write a script for the user.
7. Arrange appropriate storage.

CHECKLIST (Tick if done)

Prepares the projector	
Changes the bulb	
Inserts slides into machine correctly	
Focuses the picture correctly	
Changes the slides without faults	
Uses acceptable screening area	
Provides suitable commentary	
Selects appropriate slides	
Projects suitable number of slides and projects them for an adequate time on the screen	

HOW TO USE THE OVERHEAD PROJECTOR

¹ Lee, A and Pashuk, G.

Have you ever sat in the last row of a lecture theatre and looked at your own overhead transparencies? If you have, you may have suffered a nasty shock. The overhead projector can be an exciting and valuable teaching aid; however, in our teaching we often use such poorly planned or prepared transparencies that student learning is actually inhibited. Use of the overhead projector is now widespread in the teaching of the health professions. In some auditoria the blackboard is a thing of the past. This chapter offers a few hints that may be helpful to teachers who use this very versatile machine.

THE PROJECTOR

1. Position

In many lecture theatres or seminar rooms overhead projectors are set up for use in the same way as conventional slide projectors. Teachers should ask for better positioning of the overhead projector so that transparencies can be manipulated during the lecture without the lecture moving from the lectern. The best arrangement is to have separate screens for the two types of projector which allows for simultaneous use of overheads and 35 mm slides. For example, the slide might be a picture of a patient while the transparencies contain descriptions of clinical signs or symptoms. The screen for an overhead projector should be tilted forward to eliminate distortion or 'keystoning'; screens for slide projectors are best kept upright. This is another good argument for a two screen arrangement.

The speaker stands to the side of the screen to allow the audience an uninterrupted view. The best position in a particular room can only be found by trial and error. With the help of a colleague, move both screen and lectern around until there is an uninterrupted view of projected image and the lecturer from the most difficult seats.

2. Use of the projector

The projector should only be switched on when a transparency is being discussed. Switching the projector off between transparencies avoids the glare which will distract the viewer and also brings attention back solely to the teacher. A transparency left on too long can be a distraction especially when the topic has been changed. The use of a pointer is recommended. The pointer should be placed on the

¹ from Cox, K and Ewan, C. The Medical Teacher, Churchill Livingstone, 1982, 174 - 179

transparency and left until the item has been discussed, it should not be waved around or pointed directly at the screen. Hexagonal pencils make good pointers because they do not roll around. Coloured acetate or cardboard arrows can be used. The lecturer should never face the screen but should look directly at the audience. This reinforces the need for adequate positioning and checking before the lecture so that speakers are completely confident that what they can see on top of the projector is clearly seen on the screen by everyone.

THE TRANSPARENCY

1. Size of lettering

Most of this chapter concerns the preparation of the transparency as this is the step which is most abused. The greatest abuse is the use of inappropriate letter size. The letter size used is usually too small. How many lectures or seminars have you attended in which the writing on the transparencies can be seen only by people in the first two rows? (The speaker has no problem; he or she can read it from the projector!) A few simple guidelines can prevent this problem.

A rule of thumb is that, if the material is readable with the naked eye at 2 metres, the transparency will have adequate visibility. Normal typewriter print and print from textbooks or journals is much too small. Another formula for legibility of projected material considers three factors: the size of the lecture hall, the screen and information on the screen. The average lecture hall is about 10 metres - 18 metres long and the size of the screen varies accordingly from 1.5 - 3 metres, thus the length of the hall is on average about six times the width of the screen. A very rough way to check the legibility of transparencies is to view them from a distance of six times the width of the transparency. This simulates approximately the view that a student sitting in the far corner of the lecture hall will have of the projected transparency.

The Orator 'golf ball' element which can be used on all single element IBM typewriters is suitable for use in tutorial rooms. However, for lecture theatres this type is always too small.

2. Preparation of transparencies

Direct transparencies. Using appropriate pens, usually felt tipped, the material is drawn directly on to the acetate sheet. Often this is done during a lecture. The projector becomes a substitute for a blackboard. This has always seemed to be an unimaginative use of a versatile teaching aid. It is said that students are given a chance to copy everything in their notes by the lecturer who actually writes material on the transparency; that is, previously prepared transparencies project too much information too fast (Maddox and Loughran, 1977). The answer to this criticism is better use of prepared transparencies.

However, direct drawing during a lecture can be very effective when it is done onto a partly prepared transparency e.g. highlighting

points, adding student comments etc

The use of rolls of acetate sheeting encourage the blackboard type of usage of the projector. Rolls prepared beforehand are inflexible and cannot be readily changed around. Images are easily damaged by friction of the roller. These rolls of film offer nothing over single sheets and should be avoided.

If it is necessary to write on the transparency during the lecture or to prepare written sheets before the lecture, the same rules of image size apply. Normal handwriting is too small for overhead projection. Each letter should be at least 7-10 mm high.

Direct carbon transparencies. These transparencies consist of a piece of thin acetate film attached to a piece of carbon paper ("Rite-on", Copycraft, Sydney). This is very useful for last minute, once off, transparencies when used with the Bulletin typewriter. This product is economical and has proved extremely popular with our postgraduate students for use in student seminars.

Heat-process transparencies; The most convenient and probably the most used process in medical schools today is the heat-process, which uses machines like the 3M Thermofax, the Gestetner and Fordigraph thermo-copiers. A master is prepared by hand or typewriter and passed with special heat sensitive acetate film through an infra-red light source. The print absorbs heat thus causing an image to appear on the transparency. This is a completely dry process, and takes only a few seconds. All marks on the original must be made with heat absorbing material, for example Indian ink, soft lead pencil, or good typewriter ribbon. The more carbon, the darker the image. Ordinary ballpoint pens and coloured printing inks will not reproduce by this process. If an original does not absorb enough heat, a photocopy is excellent for use in these machines. A wide range of films is available with different image tones or coloured backgrounds. One of the clearest is the 3M film type 383/574 which gives a dense black image on a clear background. For variety, similar films with coloured backgrounds can be used (3M, type 389). Images can be made darker and thicker by a simple adjustment that slows the transit time of the original through the heat copier.

Dry paper copier transparencies. A recent development is the availability of transparency blanks manufactured for plain paper copiers. The acetate sheet is placed on top of the sheet of the normal copy paper and copied in the normal way. The Xerox product produces excellent results and 3M have a range of similar products. Paper copies of the original can be made, at the same time, for distribution to the students eliminating the need for students to copy it during the lecture. As most departments now have ready access to plain paper copiers, this material allows the production of legible (assuming the size is right) professional transparencies minutes before a lecture. This is a definite bonus for those of us who often have a good idea for an overhead too late to call in the Medical illustration unit.

Another useful product that can give the added dimension of colour to these prepared transparencies is sheets of coloured stick-on acetate especially designed by Letraset for overhead projection.

Access to a thermal copier or plain paper copier machine, and a box of film, is all that is needed to produce interesting transparencies. Photocopied tables or figures from books can be cut up and arranged appropriately on a piece of paper (stick with adhesive tape) to produce good images, but keep in mind that the legends on these figures are usually too small. The axes of tables may also need to be relabelled. Copy machines are available to make transparencies direct from books, but, unless the letters on the figures are unusually large, they will be poor images for projection. Newspaper headlines copy very well onto these transparencies and can be used for effective composition as can black and white cartoons.

Vertical Copying Camera. A facility offered by many medical illustrations units is the production of transparencies using the Vertical Copying Camera Repromaster 2001 (Agfa) or its equivalent. This system produces the best transparencies available and has the added advantage of considerable enlargement of the original. Thus diagrams from books and journals can be transformed into easily legible transparencies. Another advantage is that black and white originals can be changed into transparencies in a range of six basic colours. Many conventional typewriter type faces are suitable for this equipment as the final image is enlarged. A type that has proved very popular in our experience with this machine is the IBM Letter Gothic golf ball. A useful tip when producing the originals is to limit the area of typing to a 120 mm x 95 mm template. When this material is enlarged to transparency size, the 6 x width rule described above will be fulfilled. This equipment is too expensive to be available in individual departments and therefore even though transparencies are of the highest quality they must be planned well in advance of the lecture.

Commercially prepared transparencies. Transparencies of a very high standard can be produced by commercial companies. This is useful if teaching materials are being prepared for general distribution.

A final comment on transparencies is that no matter how they are made, they must be viewed from the most distant seat of the lecture hall before they are included in the lecture. Let us stamp out unreadable transparencies.

3. Use of transparencies.

Many techniques can result in a more effective use of transparencies.

Overlays. The imaginative use of overlays can give the overhead transparency a dimension that can never be achieved with a 35 mm slide (McRae, 1975). We all know how to use this method, but how often do we use it? An outline diagram, for example, of a limb, is attached to one side with adhesive tape so that, when it is superimposed over the original diagram, the blood vessels become visible. Complex

ables and diagrams would also be better produced on two or three transparencies and presented as overlays.

Frames. Transparencies are often better presented attached to a cardboard frame. Many commercial products are available. The frame allows more rapid lining up of transparencies when using overlays. Notes can be written on the side of the frame which the lecturer can refer to while discussing the transparency. Indeed it is possible to have all the lecture notes written on the frames thus eliminating the need to refer to the lectern. Frames allow better storage of transparencies and also protection as they can be covered with clear acetate film.

Progressive disclosure. Information on a transparency should be limited to six words per line, six lines per transparency, and no more than two illustrations. While it is possible to get away with a little more than this, a problem occurs if more than one idea or piece of information is projected at once. The viewers immediately read and copy down all items while the first item is being discussed, and thus they miss important information. This problem can be effectively overcome by covering up all but the first point, and by progressively disclosing each item as it is discussed. Each point should be covered up by a hinged flap that is firmly stuck to the acetate. Moving a piece of paper on top of the transparency is very distracting. A useful tip is to use the original of the transparency for the cover sheet, each item is now clearly visible to the lecturer before it is disclosed. Teachers should use progressive disclosures much more than they do. Watch your students next time you project a transparency with more than one point on it. Then, try progressive disclosure; you will see the difference. Examination of the students' lecture notes in these two situations will reinforce this point.

A final comment on the use of transparencies is to stress the need for rehearsal of the lecture. Even if it is impractical to rehearse in the lecture theatre, a mental rehearsal in the office beforehand can be invaluable to ensure slides and transparencies are in the right order and the timing is right. If the same transparency is going to be used more than once have multiple copies to ensure the flow of material during the lecture.

Student participation. Transparencies can be used to encourage active student participation, whether it be in large or small groups. A transparency of a laboratory request form could be distributed to students who are then given appropriate clinical histories and asked to fill in details of specimens to be collected and tests requested. This transparency is then given to the teacher who projects it on the screen, and comments on the student choice. He or she can now put on an overlay which gives the laboratory results, and a discussion on interpretation could follow.

OTHER USES OF THE OVERHEAD PROJECTOR

Often, use of the projector is limited to the display of transparencies, but many exciting visual effects can be created on the screen. For example, colonies of *Staphylococcus aureus* on a Petri

dish project very well, and the addition of a solution of hydrogen peroxide on the plate produces the most exciting example of biochemical reaction. Articulated models using acrylic materials can be constructed (Sturrock, 1976). Rotating polarizers can create the illusion of motion. The possibilities are, endless, and the only limitation is our imagination. Indeed imagination and enterprise are the key to successful use of the overhead projector. With application of some of the ideas and principles described above it can be the most effective visual aid of all.

* * * * *

USING THE OVERHEAD PROJECTOR

The preceding article is very comprehensive since it includes guidelines on how to prepare good transparencies as well as how to use the projector.

EXERCISE 1.

Study the main parts of the overhead projector so that you know their function. There are approximately 8 main parts you should be able to identify. Draw a diagram below that identifies those main parts.

EXERCISE 2.

Practice the operational tasks related to using the overhead projector. These will include:

1. Connecting the machine.
2. Focusing the image.

3. Arranging screen and seating for optimal viewing.
4. Using acetate sheets, overlays and acetate tools.
5. Writing legibly.

EXERCISE 3.

Develop a set of transparencies that you can use in the future.

EXERCISE 4.

Teach a class using the overhead projector.

EVALUATION OF USE OF OVERHEAD PROJECTOR

CHECKLIST (Tick if done)

Focuses the projected picture correctly	
Projects the picture without keystone effect	
Writes legibly for projection	
Makes a well designed transparency using at least three colours	
Uses overlay techniques effectively	
Makes an OH transparency from a photocopier	
Checks and matches electric plug with available sockets	
Arranges seating for optimal visibility	

HOW TO USE PREPARED TV MATERIAL AND FILMS IN MEDICAL EDUCATION¹

IMPLICATIONS FOR TEACHING AND LEARNING

Although television programmes can be designed and made for use in any of the ways listed, their actual success in achieving such aims is tempered by factors within the learner as much as by the realization of the pedagogy. To illustrate the types of learner characteristics and propensities which the teacher must take into account when designing and using educational television, we can take hypothetical student Z along to see some programmes with the five functions listed and note his learning responses, some of which may constitute a teaching problem.

Function 1. To Illustrate and Explain Phenomena.

On the whole, at the Open University we have found that students are most appreciative of programmes which combine pedagogical substance with an appropriate use of media. They find it comparatively easy to handle film with a clearly constructed argument, using as evidence specially designed graphics, selected film material, laboratory experiments or specially recorded discussions or interviews. It may be that this format is what students expect to find on educational courses and see in it a parallel with lectures.

As Alice Heim (1976) points out, however, some students do not find even this well-recognized format easy to cope with. Student Z is anxious; should he take notes? If so, when and how many? Prevailing Open University opinion is that films are made to be watched and that certainly on a first viewing students should be encouraged to do just this. Student Z also is concerned that he has to take the material as presented on faith - or does he? This will obviously depend on the purpose of the film but beyond simply observing it he may be required to interpret what he has seen, and to appreciate the experiment, treatment or diagnostic process, for example, in relation to what it was meant to achieve. In order to help student Z lock into the right learning gear in this case he needs some preparation. Does he need to do more than merely absorb the film material? Should he also respond to it critically?

Finally, student Z is appreciative of the visual evidence, but wishes that the programme had shown more primary information and data rather than spending so long discussing the results. The point, here, is that it is better to restrict the use of film material, when it is integrated into a teaching course, to what it can best achieve and leave, for example, detailed analysis, to discussion sessions and the printed word. Television, like the ward round, the blackboard, slides, small groups and books is a teaching method to be used as appropriate, taking into account the teacher, the course of study and its aims, the nature of the material to be taught, and the characteristics of the student as a learner.

¹ Durbridge, N and Cole J. in Medical Teacher Vol 2 No. 4 1980 163 - 167.

Function 2. To Expose Students to Particular Experiences.

Student Z has some problems with the field-trip film. He can see the value in being shown a location he might otherwise never visit but while watching the film, what is he meant to be doing? The camera has carefully selected what he will see and produced an order; it shows a system operating. But how is he meant to interpret it?

How does it relate to his practice and interaction with his patients from this ethnic group? How is he to integrate this knowledge with his knowledge of disease patterns in ethnic minorities and what he has learned about the doctor-patient relationship in general practice? Again, student Z needs some preparation which advises him that the film calls upon his previous knowledge and invites him to reassess it and its application in the light of the situation he will be shown.

Student Z also saw the programme with the Eminent Personage and is somewhat overwhelmed by his presentation and views. He tends to accept them without criticism; the film was respectful, it was authoritative, how else should he respond? Student Y was viewing it with him; she cannot stand E.P. and can hardly bring herself to listen to him at all. Most presentations need some kind of follow-up for students to benefit fully from them. In this instance, when students have accepted and understood to different degrees, it might be useful for them to compare their reactions and to replay the tape to hear what E.P. really did say, and to see how he said it. Does he, by gesture, suggest an argument which is not really valid, for example?

Case-study material may present special problems for both teacher and student. Film of naturally occurring events, or documentary-type programmes with something of a story-line make popular viewing. Indeed, they can be very reminiscent of television programmes such as 'Horizon' which are watched for relaxation.

At the Open University, we have come to recognize that a tension exists between the wish to make programmes that are stimulating to watch and memorable, and the wish to provide good instructional material. The glossier and smoother the presentation, the 'better' it may be in general film-making terms, but its very familiarity as a format can encourage students to relax and to accept what they see. In order for such programmes to achieve their educational aims, many students need help.

Our research colleagues have identified five basic dimensions along which case studies may vary. Briefly, these are didactic/open ended, structured/unstructured, active/passive, neutral/polemical and integrated/free-standing. They argue that the less experience students have in learning with film or television the more didactic, structured, active, neutral and integrated the production should be. The practical implications of these findings we may discuss in relation to the third function of educational television programmes.

Function 3. To Enable Students to Practise and Develop Intellectual Skills.

We have found that programme which uses academic intervention - pointing out in commentary what students took for before they see a sequence, guiding students during a sequence by caption or voice over, or even repeating a sequence - is often more effective in terms of the learning outcome. Students are appreciative, too, of a programme which includes exercises and questions during the transmission. In a group session the teacher may take over this role to help students, such as Z, who are unfamiliar with the characteristics of the medium. This includes both purely presentational features which may influence their perceptions and more fundamental factors which need to be considered when television is used to provide evidence from the real world. Margaret Gallagher (1978) discusses these issues further.

Function 4. To Present Material in a Novel Form or From an Unfamiliar Viewpoint.

Partly in the search for new ways of using film in the educational context, the Open University has presented dramatized material which is not in itself the subject of study, but which is used to stimulate an emotional response and to encourage students to think about a phenomenon in a new way. In a course called "The Handicapped Person in the Community", for example, one programme consisted entirely of edited extracts from Peter Nicholas play "A Day in the Death of Joe Egg". Nicholas used a particular role-play device to great effect and it was felt that some of the more extreme sketches which the parents depict would provoke feelings which might not arise from a more objective or academic approach to the problem they faced. From students' responses it seems that drama used in this way can encourage them to explore their own feelings and attitudes towards a subject.

A student like Z who is very sensitive about the subject may find it difficult to cope with the emotions aroused; he needs to be encouraged to think further about the issues. We have found that this kind of film can be an excellent and rich resource particularly when used within a group. It may provide a quick way into a discussion of some theme which the course is exploring.

Of course, such use of television and film (although not necessarily dramatized) is far from unknown in medical education. It has been used, for example, in relation to death and dying (Bleeker and Pomerantz, 1979) and sexuality (Stanley, 1978).

Function 5. To Help Students to Study More Efficiently and Effectively.

Theorists differ in their analyses of how students learn and may be helped to learn. One powerfully argued view focusses on the need to develop in students an awareness both of the demands of particular tasks and of the alternative strategies relevant to those tasks. Roger

Saljo (1979) found that students differed in the extent to which they were aware of influences upon their learning and in the broad distinctions they make between different kinds of learning. Perry (1970) argues along similar lines and believes that students develop more sophisticated conceptions of learning as they become more experienced.

Our own studies have shown that students can be helped to gain a better understanding of the role and function of audiovisual material. This involves helping students to recognize the different purposes of various uses of television, helping them to develop an awareness of different styles of film presentation and helping them to become flexible enough to adopt the appropriate learning 'gear' when viewing film material.

Since learning how to learn from television is so important, the Open University is producing a 'package' of audiovisual and written material. In it we seek to introduce students to various functions of Open University television programmes classified in broad groups along the passive/active dimension. It concentrates, in other words, upon the kind of response a particular type of programme demands of students before, during and after watching it. The 'package' aims to encourage students to think purposefully about the nature of film material, in particular, and the learning process in general. We do not suggest that medical students should work through such a package. Instead, discussion of it serves to highlight the many faceted pedagogical role of the teacher who uses educational television to facilitate his students' learning. In some circumstances the medium itself is a barrier to or distraction from the student's reception of the message. Likewise, the degree of intergration of various teaching methods and media can produce either greater confusion or greater clarity in the student's mind. Such factors should be largely controllable by the teacher, programme designer and maker.

It is now 'received wisdom' in school broadcasting that some kind of preparatory work is relevant when students are learning with audiovisual materials, and several research studies outside of the Open University support this view (see for example, Buswell, 1935). Our own researchers have also shown that follow-up work generally enhances what students absorb from a programme. It is perhaps in these two areas that the teacher, in a group session or as a facilitator of learning rather than giver of information, plays the most vital role.

* * * * *

GUIDELINES FOR USING FILMS IN TEACHING

1. View the film beforehand and decide whether it is suitable.
2. Introduce the film by mentioning the main things to look out for.
3. Show the film.
4. Discuss the film identifying misconceptions or important points that were missed.
5. Show the film a second time. When necessary, switch off sound track to make comments.
6. Recapitulate the main points.

EXERCISE 1.

Study the main parts of a projector so that you know the function of the main parts. There are approximately 14 parts you should be able to identify. Draw a diagram below that identifies the main parts.

EXERCISE 2.

Practice the operational tasks related to projecting films using a 16 mm projector. These will include:

1. Connecting the machine (including using an extension cord and transformer).
2. Threading a film.
3. Focusing the picture.
4. Setting up the speaker and adjusting the sound controls.
5. Running a film.

6. Rewinding a film.
7. Splicing a broken film.

EXERCISE 3.

Using any film available, assess its educational value. To do this, design as a group an evaluation format. Then view the film and assess its educational value.

EXERCISE 4.

Show a film to a group of students.

EVALUATION OF USE OF 8 MM/16 MM FILM PROJECTOR

CHECKLIST
(Tick if done)

Connects the machine correctly	
Places projector in good projection position	
Threads the film correctly	
Focuses the picture clearly	
Adjusts sound to clearly audible level	
Runs the film, adjusting controls as necessary	
Rewinds the film correctly	
Splices a broken film	
Follows accepted viewing procedure	

CLOSED-CIRCUIT TELEVISION

This is a useful aid for showing small-scale demonstrations, dangerous experiments such as those in which radioactive materials are used, and objects under a microscope. Dissection and the taking of specimens from constricted areas, such as the nose and the throat can be brought before a whole class of students as and when required.

We have found closed-circuit television useful in teaching microscopy by placing the camera in the correct relationship to the microscope. It requires experience in setting up, and suffers from the fact that colour cameras and sets are expensive, so that the images are usually restricted to black and white. Where colour is available it is superior to the microprojector.

The good teacher is well aware of the constant need for programme revision and improvement in teaching method so that his student group will learn the subject more quickly and effectively. Can closed-circuit television help him in his tasks; if so, how should it be used, how much does it cost and what are its advantages and disadvantages? These and other questions must be answered before an investment is made in television equipment.

What are the capabilities of closed circuit television? The following paragraphs list a number of the outstanding capabilities of the television medium, together with some specific indications for use in teaching.

- 1) Magnification of image. There are many situations in teaching where image magnification can be of immense value in improving student learning. An effective screen demonstration in anatomy or of the intricate details of an experiment in physiology enables each individual student to see the whole area of operation considerably enlarged. A demonstration of pathological specimens gains much from its enlarged image on the screen and, through the simple attachment of television camera to microscope, the entire class can see clearly histological or pathological material at whatever magnification is appropriate.
2. Multiplication and distribution. For large classes it is possible to place an appropriate number of receivers in series so that every student has a clear and uninterrupted view of the screen. A particularly important talk or demonstration can also be made available simultaneously to students in many different parts of the faculty. The advantage of the medium's capacity for distribution lies in bringing large number of viewers into situations which are either cramped or in some way inappropriate for the presence of more than one or two persons. There are many examples in medical teaching which come within this category.

- 3) Ease of filming for simple sequences. Expect where expensive productions are required, television normally demands no special lighting. More and more equipment is becoming available which is portable, battery-operated and capable of being set up and used at a moment's notice. This means that an emergency can be recorded without holding up treatment. In comparison with normal movie film, television possesses also a number of other advantages. There is automatic image/sound synchronization. The absence of need for development and printing allows an immediate play-back from videotape (which is recorded directly and stores be reshot and the unsatisfactory sequence is wiped off the tape during the rerecording).
- 4) Immediate play-back. Unlike ordinary film, the videotape is a recording which can be played back immediately. The usefulness of this for teacher training (micro-teaching) or for teaching students the techniques of patient interviewing is self-evident. The latter use is by no means restricted to students and many psychiatrists welcome the opportunity of viewing their own performance and of discussing it with their peers after, for example, a psychotherapy session. By linking the camera up with an intensifier in the X-ray department, immediate or later play-back of such procedures as barium swallows and heart catheterization can be provided for teaching purposes. It is interesting how, even when the image is recorded, the television screen gives the impression of immediacy. The "eye" contact between this medium, which demands from the teacher different technique from that to which he is accustomed to in the classroom.
- 5) Visibility of television screen without room blackout. This is a particularly important advantage as it means that the medium can be used without all the preparations usually associated with traditional film showing. It is true that where rear projection screens are available for films this advantage no longer applies, but few faculties have so far equipped themselves for this type of projection.

There are a number of minor limitations to the medium of closed-circuit television which need to be recognized by faculty staff. The image is, in general, inferior to that of film, although this disadvantage is usually more than outweighed by the ease and speed of production. When a recording is transferred from videotape on to 8 or 16 mm film, any poor quality in image becomes obvious. However, many unusual or emergency situations could never have been recorded if reliance had had to be placed on filming, with all the special lighting and other procedures which the latter involves. Editing of tape is difficult and on play-back it is not always easy to locate the beginning and end of a particular sequence.

Videotapes will deteriorate eventually after continuous use and they have therefore to be considered as expendable items. The problems of incompatibility of play-back equipment become important only if it is intended to run an exchange system between different faculties or to borrow videotapes from one central library.

COMMENT ON USING TELEVISION IN TEACHING

In this manual it has been our intention to develop the teacher's skills in using appropriate technology. For this reason we have included only a brief mention about the possibilities of using television rather than "hands-on" guidance for teachers. Television is not, and is unlikely to be, a common teaching aid in health training institutions in Africa in the immediate future. Teachers wanting more information about using television are referred to those specialized institutions that are using CCTV or commercial networks.

One word of warning. In this programme of teacher training, early experiments with video have convinced us that there are tremendous problems in successfully implementing videoteaching based on:

- 1) incompatibility of software which makes it too expensive for individual institutions;
- 2) technical expertise to keep hardware functioning is in short supply;
- 3) high cost, including lack of foreign currency.

For these reasons, we have chosen not to develop the use of VTR in our programmes until the technology becomes more appropriate and economic.

MICROFICHE

The use of microfiche has become popular because:

- 1) it is a cheap and convenient method of storing large volumes of information;
- 2) the machines to read microfiche are simple to use and maintain.

The common use of microfiche is in storage of reference catalogues, but it can be used to produce colour transparencies as well.

Microfiche readers are most commonly found in libraries, but are also found in commercial businesses.

EXERCISE 1.

Visit a library that has microfiche readers, and try using the machines.

EXERCISE 2.

Discuss the feasibility of developing the use of microfiche in your own library. How could a low cost microfiche reader be developed?

SKILL TWO

DESIGNING AND USING NON PROJECTED VISUAL MEDIA

The principles of using all non projected media are similar, and they have similar advantages and disadvantages over projected media. The most obvious advantages are in their cost, the flexibility of use, and that they are at an appropriate level of technology. They have limited value for the teacher who wants to illustrate complex concepts, but the creative teacher can develop non projected media that show quite sophisticated phenomena or concepts.

The manual gives an overview of those media and some exercises in their use and development follow.

BLACKBOARD

The blackboard should be in occasional, if not in constant, use during an oral lesson. If the lesson is one of continuous exposition, each major point should be written down as it is established so that at the end of the lesson the teacher will before the class give a brief but comprehensive summary of his major points. The lesson in the essential features of its anatomy will be before the students' eyes, and if the students make notes of the lesson obviously such a summary will be of the greatest assistance to them. The best way of constructing this blackboard summary is to write during the lesson the points 1,2,3,4, and these points emerge. Sometimes it is convenient to write a summary before the lesson begins, so that the class is informed beforehand of the aim of the lesson. Students often listen more intelligently if they know an outline of what they are going to hear. At other times the blackboard summary may be constructed during the vital process of recapitulation. If recapitulation takes the form of questioning, the blackboard summary that is before the eyes of the students forms its most convenient basis.

In many lessons however, particularly in those where the class, possibly after some preliminary explanation, is working individually from books, the blackboard is best used incidentally to explain some process, or some general error, which requires explanation to the class as a whole. Similarly, whenever terms have to be explained or unusual words come into use, they should be written down so that the visual memory of the students may be exercised.

There are certain elementary matters to be considered in the use of the blackboard:

- 1) Handwriting should be legible.
- 2) If the blackboard is a movable one it should be placed so as to be visible by all the students.
- 3) The matter written on the blackboard should be orderly and tidy; it should be restricted to about 6 lines in any one unit.

- 4) What is written on it should be large enough to be seen by all students without strain. In the normal size of room the students may be 10 m from the board.
- 5) Lettering should have a minimum capital letter height of 2 cm.
- 6) Colour should be used to emphasize important points. The aggressive colours, yellow, and orange, are best; the more restful blues, greens, browns and purples do not "carry" so well.

MODELS

These have the advantage, over most other aids, of being three-dimensional. If the model can be taken apart and reassembled by the student, so much the better. Professionally produced models tend to be expensive and over-elaborate for teaching purposes. The model quickly made by tutor to meet a particular situation is often the most successful. Old pieces of polystyrene are particularly useful in this connection.

CHARTS AND POSTERS

These are best produced by the tutor in response to a given situation. A good poster should attract attention, hold attention and deliver its message with the minimum of lettering. Charts can be rapidly and accurately produced by means of copying via the epidiascope. Quick-drying poster paints can be used to produce brilliantly coloured outlines. Charts appropriate for teaching medical technology are available free from some of the large pharmaceutical companies.

BOARDS

Boards other than blackboards - plastigraph, flannel, and magnetic boards, for instance - use diagrams, letters, numbers and cut-outs previously prepared by the tutor or manufactured. They have the advantage of vivid impression, speed in assembly and flexibility in arrangement. They save time in the lecture room.

The plastigraph offers the advantage of simplifying complicated structures by either peeling off cut-outs or building up a series of overlays on clear sheets of polyvinyl chloride to reveal the details of a structure. Since adhesion is by a combination of atmospheric pressure and static electricity, there is no loss of adhesion with use.

Flannel boards are based on the friction of the surfaces that will adhere to each other. Flannel or blankets can provide the base and sandpaper or similar abrasive surface for the backs of the cutout figures. A plastic hooked material is obtainable which will readily cling to certain nylon materials. Adhesion is very positive and considerable



weight may be supported by small pieces of this material stuck on with an adhesive.

Magnetic boards are made up of steel sheet background with card or hard back cut-outs which have small magnet glued at the back. Rubber-based flexible magnetic materials are also available. Magnetic boards are particularly suited to the movement of objects to different places, for example, in the building up or breaking down of systems.

EXERCISE 1

Design an evaluation form for assessing visual aids. (We suggest you consult Farrant, 1981, p. 298). Using that format, now evaluate a teacher using the chalkboard. How could the use of the chalkboard in that instance be improved?

EXERCISE 2

Try using a flannelgraph from the educational resources area. Having tried using it, then design a set of cutouts to illustrate a concept from your own curriculum area. Use velcro, sandpaper, blotting paper or lint on the backs of the cut outs.

EXERCISE 3

Locate a plasticgraph board and materials and try using the material. Consider its application in health training programmes. Find out the suppliers of plastigraph equipment.

EXERCISE 4

Mount a display on softboards in the museum area or classroom on a topic of interest to your colleagues or students. Use a variety of graphic materials such as poster, photographs, cuttings etc.

EXERCISE 5

Design a poster or a wall chart.

EXERCISE 6

Design a flip chart.

TAKING PHOTOGRAPHS

Cameras can be used for taking black and white, colour photographs or 35 mm slides. In the health training situation, black and white pictures, mounted in some permanent display form, such as on cards or in files showing procedures or physical characteristics such as drainage of buildings, roofing materials, these are extremely useful. 35 mm slides in colour are also particularly useful for demonstrating clinical or pathological features that are otherwise difficult to describe.

In order to get suitable photographs, it is easier for the teacher to take her own photographs and get them processed either commercially or in any photo processing unit such as health education or medical illustration units.

EXERCISE 1

Practice the operational tasks related to taking photographs. These will include:

- 1) Loading a film.
- 2) Using the viewfinder.
- 3) Adjusting the controls for exposure, focus, aperture.
- 4) Taking pictures.
- 5) Using light meter.
- 6) Setting film speed.

EXERCISE 2

Take a series of photographs in different settings. Note the exposure, aperture, focus and subject. When the photographs are processed, note which were successful and why.

EXERCISE 3

Mount a set of slides or photographs to illustrate a topic. Organize them and label them into a logical and clear sequence.

CHECKLIST
(Tick if done)

Uses of viewfinder	
Operates mechanisms that vary the (i) focus (ii) aperture (iii) length of exposure	
Depresses 'take' button without moving the Camera	
Loads a new film	
Photographs still objects in natural light within normal range of focus of Camera	
Takes pictures of moving objects	
Uses light meter	
Selects and displays photographs effectively	

S K I L L T H R E E

D E S I G N I N G A N D U S I N G W R I T T E N M A T E R I A L S

WRITTEN MATERIALS

Written materials are some of the most useful instructional resources we have available to us. They are relatively cheap, durable and accessible. However, they are not always readily available to students in health training institutions in Africa so the teacher needs to look to developing her own materials, that are relevant to the particular situation.

In the following sections, we consider the design and use of handouts, laboratory exercises and teaching manuals. The writing of any of these materials is not easy and takes a lot of time and care. Simple language should be used at all times, and local examples or cases cited. The wholesale unacknowledged use of already published work of another author infringes copyright, and should not be done.

The design and use of programmed lessons has been discussed in UNIT THREE.

HOW TO IMPROVE HANDOUTS

G: BROWN AND TOMLISON,

THE USES OF HANDOUTS.

The major potential uses of handouts may be summarized as follows:-

Handouts used by students in private study may:

- State the prerequisites for a course or class (orientation)
- State the learning objectives for a course or class (direction of work).
- Indicate alternative sources of information (reinforcement of learning).
- Provide supplementary information (expansion of learning).

Handouts used by students during classes may:

- Provide an infrastructure for the topic.
- Emphasize crucial points and generate perspective.
- Provide a framework for interaction between teacher and students.
- Help students to receive detailed information.
- Guarantee the accuracy of transferred information

WHAT RESEARCH SUGGESTS.

Research on handouts, the related topic of note taking in lectures and the design of instructional texts is relatively scant. However, the research does provide pointers to two questions which are often asked about handouts. Here are our cautious answers which are based on research and experience.

ARE LECTURE HANDOUTS USEFUL TO STUDENTS?

Students perceive handouts as useful and many do use them before examinations. Experimental studies based on immediate and delayed recall tests have not yielded clear cut results. On the whole, the results suggest that students who receive handouts do better in tests than those who do not, and handouts are particularly useful to poor note-takers.

WHICH KIND OF HANDOUTS IS MOST USEFUL?

Given that handouts are useful to students, which kind of lecture handouts appears to be better, the complete set of notes or an outline of the lecture? Northcroft and Jeurstedt (1975) showed that students who receive lecture outlines scored significantly better than students who received either a complete transcript of the lecture or a full set of notes. Later studies have yielded equivocal results. (Fisher/Harris 1974)

Major difficulties in research on the use of handouts arise from the variation in the type of handouts and the interaction between handouts and note-taking strategies. Despite these difficulties, in one set of studies Hartley (Hartley and Davies 1978) was able to show that handouts led to improved recall, that students took more notes on points omitted from the handouts and that students who had to fill in omitted key points, definitions and phrases, did better on a subsequent recall test than students who had received the complete outline of the lecture. These studies suggest that outlines of lectures which require responses from students are probably the best general type of handouts for use with lectures.

WHEN SHOULD A HANDOUT BE GIVEN TO STUDENTS?

Obviously, handouts pertaining to the entire lecture course should be given out at the beginning of the course.

The more common question relating to class-specific handouts is: Should I give the handout to students before the lecture or after it? The study by McDougall et al (1972) indicates that the students who received the handouts before the lecture performed better on subsequent recall tests than those who received the handout after the lecture.

There are, however, two exceptions to the promise that lecture handouts are best given out before the class. First if the handout is likely to pre-empt the excitement of the lecture, then give it out afterwards. Second, if the handout is a study unit or booklet then give it

out either a few days before the lecture or after the lecture.

DESIGNING HANDOUTS.

Our experience of handouts as former students and our involvement in their production for the job they are required to do, tend to deflect considerations away from the aesthetics of their composition. Nonetheless handouts can be made attractive and free of unnecessary barriers to learning.

The first and obvious question when designing a handout is: What is it for? If it requires insertion of student responses then these should be marked clearly. If students are required to make extended notes then the text should be opened up to leave ample space on the sheets for notes and additions to diagrams.

The second and equally obvious question is: Who is the handout for? The kind of information that you might provide for the first-year, pre-clinical students would obviously be different from that for post-graduate clinical students.

These two questions are simple but no less important for that. In addition, it is worth considering the typographical layout of the handout. Lower case is easier to read than capitals. Italics slow down reading and so should be used for emphasis only. Bold type also highlights statement. The use of summary statements typed in the margin emphasizes the content of the paragraph. Spaced sections and double-spacing are easier to read.

Because illustrations are eye-catching they may lead to the reading of the text close to the illustration. Hence the importance of positioning illustrations appropriately. Tables of results which occur at the top or bottom of a page are less likely to be read than if they occur in the middle of the page.

A SYSTEMATIC APPROACH TO THE USE OF HANDOUTS.

This can be summarized as follows:

- 1) Define the area to be covered.
- 2) Write and refine learning objectives.
- 3) Determine the most appropriate structure for the class(es) with a view to promoting attainment of the objectives.
- 4) Determine whether extramural handouts are needed.
- 5) Determine whether handouts for use during the class would benefit the learning.

- 6) Prepare draft handouts and lecture (or other class) notes.
- 7) Review (with a colleague) the relation between learning objectives, teaching notes and handouts.
- 8) Determine whether or not the handouts are likely to be sufficiently powerful to be warranted.
- 9) Have the handout prepared, check the proofs and have copies made by the most economical means.
- 10) Give the handouts to the students and tell them why the handouts were made and how they should be used.
- 11) Determine whether or not the handouts were useful.

CONCLUSION

We believe that handouts which are designed to provide a framework for the structuring of student participation in lectures will usually succeed, provided that the handouts are suitably constructed. Handouts which present information for passive reading are less certain of success.

* * * * *

DESIGNS OF LABORATORY MANUALS AND DISPLAYS.

The first recommendation is that teachers should present students with the written instructions for laboratory classes (procedures, etc.) collected together in the form of a book or binder. Students will be able to obtain an overview of the course and plan their learning accordingly. The book will look more professional and appealing if it has a cover, however simple, which has been specially designed for the course. Some teachers are adept at artwork and enjoy producing designs themselves. If not, graphic design firms can produce artwork quickly and cheaply, incorporating, if desired, electron micrographs or other illustrations provided by the teacher. The pages of the book when copied or printed should be bound so that the book will lie flat on a laboratory bench.

The most important factor in arranging the contents of a laboratory manual is simply to ensure that students do not encounter unnecessary difficulties in locating instructions. Any techniques for streamlining are an advantage. Inclusion of a good index, page reference and timetable are of obvious importance. In some disciplines it is necessary to provide extensive technical details. These are best separated from instructions for individual laboratory exercises and can be effectively collected in a well-organized appendix.

Aims should be explicit.

When writing a laboratory manual designers should remember that things which are 'obvious' to teachers can be quite unclear to students or, worse, they can be completely misconstrued. Therefore the aims of each exercise should be explicit rather than implicit. Students should be informed about what new knowledge or abilities they will have acquired after successful completion of each exercise. Furthermore, laboratory exercises should be set in their educational contexts, i.e., if a laboratory exercise is regarded as 'introductory', mention the goal for which it is prerequisite. Conversely, if an exercise is regarded as 'advanced', mention specifically the prior knowledge and skills which must be used. Student complaints about lack of relevance have often been caused by complete failure by teachers to explain the sequencing of their coursework.

Instructions should be clear.

In the instructions for a laboratory exercise teachers should notify students of the nature of materials and equipment provided or available on request, especially the location of materials, the

¹ from Cox, K and Ewan, C. The Medical Teacher Churchill Livingstone, 1982, 154 - 158

quantities and the arrangement (what must be shared by the whole class or by groups? what is available for individual use?). In laboratory classes where written notification is not provided, students can waste a great deal of class time discussing organizational details.

Questions are important.

Education research reviewed by Faw and Waller (1976) suggests that questions are a valuable part of a laboratory manual and are usually best located immediately after an exercise or a small group of related exercises. Commonly, teachers think of questions as a means of evaluating what students have learned. Carefully designed questions can serve other functions.

Questions can often add interest value and motivation. More importantly, questions are cues. They alert students to crucial points in the laboratory work (for example, crucial skills, measurements or observations, crucial knowledge, crucial methods of interpretation). Questions can challenge students to go beyond the immediate exercise, for example, to discuss the clinical or social implications. Figure 1 shows a list of questions which accompanied the instructions for a biochemistry laboratory class on blood lipid components and which illustrated a variety of approaches to the art questioning:

The list shows questions printed in a biochemistry laboratory manual following instructions for a laboratory exercise entitled 'The Biochemistry and Blood Lipid Components'.

1. *What are the triglyceride and cholesterol levels of the two unknown sera?*
2. *What is your tentative diagnosis of the lipid disorders involved?*
3. *How could you use the cholesterol assay method quoted to determine the relative proportions of free and esterified cholesterol?*
4. *A patient has mild hypercholesterolaemia. Why is it advisable to control this by dietary restriction rather than drug therapy?*
5. *Cholesterol is synthesized solely by the liver. True/False.*
6. *Disturbances in carbohydrate metabolism, such as diabetes mellitus, have no effect on cholesterol synthesis. True/False.*

Fig. 1 Effective use of written questions in laboratory teaching

Illustrations should be of good quality

Any displays or illustrations used in laboratory classes should be of high standard. Useful guidelines are provided in the review by Garrick (1978) and the Booklet Static Displays - Poster, Wallcharts, Exhibits - in Medical Education (Department of Audio Visual Communication, BMA, 1973). With the modern technology available, it is inexcusable to have carelessly handwritten signs, diagrams and illustrations in laboratory classes. Besides the lack of aesthetics, poorly prepared displays give students the message that the material is unimportant.

If a display used in a laboratory class contains lengthy written material or essential graphs, students should not be encouraged to waste class time by copying it all down. Rather, teachers should provide handouts containing key points. Photo-reduction of illustrations is a valuable aid in the preparation of handouts since it saves re-drawing of material prepared for the display.

Finally, it is a rather obvious but important point worth stressing, that irrespective of high standards of preparation of laboratory manuals and displays, the success of a laboratory class depends ultimately on the quality of materials and equipment actually provided on the day of the class. It is therefore essential to institute a thoroughly efficient system for delegating tasks, for ordering, planning and preparation of materials, and for quality control.

DESIGN OF LABORATORY EXERCISES TO MEET IMPORTANT GOALS OF MEDICAL TEACHING.

The design process for individual laboratory exercises involves (i) definition of the knowledge necessary for successful completion of the exercise; (ii) selection of manual or observation skills to be learned or practised.

The publication of details of teaching strategies is all too rare. In this section two exercises from a course of microbiology for medical students are discussed (reprinted from Hegarty and Lee, 1979). These examples are products of the design process described above. The goal of both exercises was to allow students to apply their knowledge of the science and methods of microbiology to an obviously medical situation. The first structured exercise involved in the use of several simple practical skills, while the second, less structured case history forced students alternately into the roles of microbiologist and clinician, thus giving them an appreciation of the place of microbiology in medical practice.

In these case studies students are expected to use certain skills of the professional microbiologist, for example, recognition of bacteria in stained smears, recognition of colonies. However, it is not intended that students retain these skills and the skills are certainly never assessed formally. Rather, these are regarded as intermediate skills in the process of achieving the general goals of the course. This was made

clear to students by including the following statements in the laboratory manual.

General objective of the laboratory classes.

That students appreciate the principles and practice of diagnostic microbiology in order to be able to effectively and efficiently utilize a diagnostic medical microbiology laboratory in the management and treatment of infected patients.

To achieve this goal it is felt that students should be exposed to 'real life' situations in the form of case studies and carry out some of the diagnostic steps of the medical microbiologist. It is not important that the student be able to acquire all these skills. Rather he/she should have a clear understanding of how to use the staff and facilities of a microbiology laboratory.

A structured case study in microbiology:

In the exercise shown in Figure 2, the format is **structured** in a way that restricts the knowledge or skills used by students to a manageable level appropriate for an early stage of a course. The case history is of a woman with a mixed anaerobic infection of her gall-bladder. Three different organisms, *Escherichia coli*, *Streptococcus faecalis* and a *Bacteroides* species were isolated from the pus.

To reach this diagnosis students must:

1. apply the following knowledge

An 84-old woman was admitted to hospital after a sudden onset of abdominal pain and vomiting. Her temperature rose to 40°C . Her white blood cell count was 11×10^6 . An X-ray of her upper abdomen showed stones in her gall-bladder and in her bile duct but no gas. At laparotomy, 10 ml of pus was drained from her gall-bladder.

Material:

(per bench)	Gram stain of smear of pus.
(per group)	Cultures of pus on sheet blood agar incubated aerobically and anaerobically. Culture of pus on MacConkey agar.

Procedure:

- (a) Smear and stain representative colonies from the growth on the sheep blood agar plates.
- (b) Examine the pus smear and correlate the microscopic morphology of organisms present with those isolated on the plates.

Results:

Diagnosis:

Fig. 2 Structured case study in microbiology.

- a. The type of bacteria likely to cause a gall-bladder infection (especially those originating from the gastrointestinal tract).
- b. The appearance of these organisms on common growth media.
- c. The Gram-staining reaction of these bacteria.

2. successfully perform the following series of simple manipulations taught earlier in the course

- a. Preparation of simple smears.
- b. Gram stain of the smears.
- c. Use of microscopes with oil immersion objectives.

An unstructured case study in microbiology.

This is significantly more complex exercise that requires students to make many decisions relevant to their future careers. The case history and student instructions are shown in Figure 3. The patient had endocarditis caused by the bacterium *Streptococcus viridans*. When working on this case the students are challenged to apply a wide range of microbiological knowledge and demonstrate a number of important skills, for example:

1. The types of microbial infection consistent with the signs and symptoms described in the history.

A 50-year old man, an accountant, presented with a history of increasing weakness and lassitude over a period of about 3 months. At the examination the patient was described as a pale man of medium build whose temperature over a period of 5 days varied between 37° and 38.3°. The spleen was said to be palpable and slightly enlarged. Laboratory findings were, Hb 123 g/l, WBC 13 x 10⁶/litre, with 83 neutrophils, ESR 65.

Material: Laboratory Request Forms.

Procedure:

- a) Read the history and decide what specimens should be collected and what tests are needed.
- b) Fill out a laboratory request form for each specimen and hand it to your tutor. You will be given the appropriate Gram stains and primary culture plates etc.
- c) Examine the material and make presumptive diagnosis. Ask your tutor for any further material you require to confirm your diagnosis and complete the investigation.
- d) Complete all the laboratory reports in a way that you consider would be most useful for the attending physician. These forms should be signed and handed to your tutor
- e) Decide what treatment you would recommend and estimate the likely prognosis.

Fig. 3 Unstructured case study in microbiology

2. Selection of appropriate specimens and modes of transport to the laboratory
3. The organisms involved in each of the possible diagnoses.
4. The cultures, the serological and other types of tests which should be done in the laboratory.
5. The likely appearance or reactions of suspected organisms after culture or testing.
6. Interpretation of laboratory results and how the laboratory report should be written.
7. Appropriate treatment and likely prognosis of patients with bacterial endocarditis.

The format of the exercise is structured so that as far as possible the students' actions simulate the sequence of activities in a 'real life' situation but over a vastly reduced time period. This is achieved by having all the material for this contained in a 'tutor's kit'. (Fig 4), an opaque box with lid under the control of a staff member. The tutor can monitor the students' progress by noting the quality of requests for materials. Relevant or irrelevant material can be released by the tutor to allow the students either to pursue a number of feasible differential diagnoses, or to examine inappropriate material and thus "learn by their mistakes".

Using this technique, tutors can make this a very valuable learning experience. Diagnostic decisions can be challenged and students asked to justify their choices. The method is also economical in material

Material necessary for the correct diagnosis

Blood agar plates labelled 'Sub-culture from blood culture broths. Aerobic/anaerobic' (both showing growth of Streptococcus viridans).

Material consistent with alternative general diagnosis of 'pyrexia of unknown origin'

MacConkey plate labelled Faeces (showing normal faecal bacteria.)

Card with printed negative results of serological tests for typhoid fever.

Card with printed negative results of serological tests for brucellosis and glandular fever.

Set of serological tests for syphilis.

Material relevant to further management of the case

Card showing the results of quantitative penicillin sensitivity tests for the strain of Streptococcus viridans

Material inappropriate to the case

Blood agar plate labelled Throat swab (showing growth of normal throat flora).

as only one set of slides and other material is required for groups of twelve students. Five or six cases are available for each group to use during two-hour class; students are encouraged to work in pairs and complete as many cases as possible.

The selection of material for inclusion in the tutor's kit will vary depending on the aims of the exercise and the opinion of the course planners on the need for practice of microbiological techniques. Thus, in the case as presented above, students would have to do a Gram stain on the culture from the blood plates to confirm their diagnosis. However, if decision making is the major aim of the exercise, pre-prepared stained smears can be provided in the box and students would save more time for interpretation and discussion or for working on other case studies.

* * * * *

TWO vital considerations face the writer of health learning materials: the need for his material to be relevant, and to be usable. A relevant book is one that matches the user's needs: it contains what he needs to read. It may or may not be usable. The usable book matches the user's abilities: it is presented in such a way that he can use it, even though it may or may not be relevant. Relevance thus refers to the content; usability refers to the presentation. The two are closely related, and both important. Usable irrelevant books are no substitute for relevant though usable books. Below are noted some further points concerning the relevance and usability of written materials.

RELEVANCE

The search for relevance in health learning materials has concentrated upon two areas:

- the relevance of the health 'technology' to the health problems and needs of the communities in which it is to be practiced;
- the relevance of the technology to the level of understanding, competence and responsibility of the health worker using it.

In writing health learning materials, therefore, a series of steps needs to be followed:

- identifying health needs, and appropriate interventions;
- specifying appropriate job descriptions;
- identifying needed competencies;
- designing training based on the competencies required;
- producing learning materials for this training;

producing additional support material, both for the training, and for continuing education, reference and guidance after training.

USABILITY

In recent years, concern for readers using books and learning materials has gone beyond the basic concepts of literacy and 'understanding'. Many new terms are in use at present. comprehensibility,

¹ A paper presented to a workshop, AMREF, 1981.

readability, communicability, usability. All these terms suggest the wide range of problems encountered. These problems however, seem to be grouped into two main areas:

- The Cognitive demands of learning from reading, following instructions, making decisions, applying information, solving problems;
- The operational demands of referring to material, using an index, interpreting pictures and diagrams, using appropriate reading strategies, (mainly adjusting the speed at which to read for skimming, scanning, or reflecting on what is being read).

As far as health workers are concerned, a further area of concern is in the professional demands of applying generalized knowledge of health in the particular cases of patient and community needs.

Behavioural, educational and linguistic research has suggested that there is no one answer to these problems. Rather, the solution seems to lie in selecting the appropriate presentation of material to suit the needs of particular readers and situations. It is suggested that this selection is necessary across four aspects of presentation:

- controlling the language in which material is written to match it to the reading level of the readers;
- designing, or structuring the material to suit the situation it is needed for: as learning material, for general reference, for teaching, for on-the-job guidance;
- adjusting the physical layout of the material to suit the needs and skills of the readers: e.g. use of non-prose formats (notes, flow-charts etc) illustrations, diagrams, tables;
- considerations of the need for training in the use of the material, introducing it in non-training situations, teachers guides, supplementary exercises, etc.

CONCLUSION

Much existing health learning material is open to criticism, as regards both relevance and usability. This is largely the result of shortage of material, leading to the use of inappropriate material with a wide range of workers, and of inadequate specification of the demand for relevance and usability, leading to assumptions that material is both relevant and usable.

* * * * *

BOOK ASSESSMENT FORMReaders and Use of Book

Date

	Medical	Nursing	Environmental	Village
Senior				
Junior				

Put: C for a Course Book
 R for a Reference Book

Title:

Author:

Publisher:

Price:

Subject(s) covered

Tick on the right for your assessment of each point

CONTENT

Mainly Partly Not at all

Is the subject matter based on relevant health needs:

Mainly	Partly	Not at all

Is the subject matter based on appropriate methods:

Mainly	Partly	Not at all

Is the subject matter based on specific job descriptions or a specific curriculum:

Mainly	Partly	Not at all

Is the coverage complete and well balanced:

Mainly	Partly	Not at all

Does it describe 'what to do' adequately

Mainly	Partly	Not at all

Does it contain practical instructions on 'how to do it':

Mainly	Partly	Not at all

Does it need any support material:

Mainly	Partly	Not at all

Mainly Partly Not at all

Is the language controlled

--	--	--

Is the physical layout of
the material well presented:

- text: headings etc

- pictures

- non-prose formats

- diagrams and tables

Is the referencing system adequate:

- index

- table of contents

- numbering

Does it need training in how to
use it:

Other Comments

EXERCISE

Select several books that you have used in your previous teaching or would like to use in the future. Assess these books using the suggested BOOK ASSESSMENT FORMAT. Make a decision as to whether you consider these books really useful in the light of your assessment.

STUDY PROJECT

Design either

- 1) a teaching manual
- 2) a laboratory manual
- 3) a set of handouts

based on the principles outlined in this section.

This project should normally be undertaken as an integral part of the elective study programme.

S K I L L F O U R

D E S I G N I N G A N D U S I N G A U D I O M E D I A

RADIO

The use of radio in schools is very common, particularly since the availability of transistor radio has meant a cheap and accessible form of communication. Unfortunately, the radio is only as good as the programmes it receives, and while school broadcasts are well developed, the use of radio in health training programmes is almost non-existent.

Radio programmes can provide material aimed at teaching lessons for a specific syllabus; for stimulating further study on a topic; or provide material not directly linked to any specific syllabus. At the moment, the most useful material is the latter, that is, enrichment material for a teacher to broaden the students experiences or attitudes in a subject that relates to their work in health. These programmes are rarely broadcast at suitable times and the teacher is more likely to have to tape a broadcast or radio programme for later use.

TAPE RECORDER

Audio tapes, either reels or cassettes, are extremely useful to health trainers.

Tapes can be a source of information, such as:

- 1) Interviews
- 2) Radio lectures/documentaries
- 3) Discussions
- 4) Commercially prepared lectures
- 5) Plays
- 6) Simulated/real sounds (e.g. heartsounds)

They can also be used to provide feedback to students about what they are doing and saying such as:

- 1) Clinical skills, such as interviewing
- 2) Language learning

EXERCISE 1

Practice the operational tasks related to using the tape recorder. These will include:

- 1) Preparing the machine
- 2) Cleaning the recording heads.

- 3) Thread tape
- 4) Operating the controls to record, play and rewind.
- 5) Recording through radio and microphone.

EXERCISE 2

Use the tape recorder for either:

- 1) Interviewing to collect information.
- 2) Making a documentary programme.
- 3) Recording a radio programme relevant to health training.
- 4) Providing a commentary for a set of slides.

EXERCISE 3

Splice a tape to join two recordings.

SKILL FIVE

USING AUDIO VISUAL OR MULTIPLE MEDIA

USING MULTIPLE MEDIA

This section briefly considers the use by the teacher of several media together. As such they do not require new skills, particularly of operating the machines. However, the use of multiple media means that the teacher has to hand over, however temporarily, control over to the machines and the media themselves. The skill now needed of the teacher lies particularly in selecting suitable multiple media, such as tape/slides sets, films, computer programmes that justify the time and expense in using them.

Thus, the characteristic common to all multiple media, apart from the cost, lies in the decreased control by the teacher which can free the teacher to be more available for individual or small group tuition.

It is unlikely that the use of multiple media will become extensive in Africa in the immediate future, partly due to costs of the materials themselves, and partly due to the lack of equipment. However, there are two other reasons why health trainers are not using multiple media - their reluctance as trainers to hand over the responsibility of telling students, of 'giving' them the information themselves. This is an attitude or belief of health trainers that determines to a large extent how and when trainers use particular media. The other reason lies in the fact that too often materials that are available are not appropriate or relevant in terms of language, level or cultural significance. These two mentioned problems are the major obstacles to the development or use of multiple media in health training institutes, and problems of cost are secondary.

EXERCISE 1

From the resource centres available to you obtain a sample of a multiple media learning material. Arrange to view the package or material. If the material requires the learner to complete a learning programme, such as completing answers to questions, complete the material as requested.

EXERCISE 2

Discuss in your small group the multiple media material that you have completed. Decide between yourselves whether the material conforms to the principles of programmes learning. What are the limitations of this kind of material in your own institution? Can you see opportunities for introducing this material? Who would you have to convince? Yourself? Your colleagues? Your students?

SKILL SIX

STORING AND RETRIEVING INSTRUCTIONAL MATERIAL

RESOURCE CENTRES

Resource centres can operate as display areas, storage and listening/reading area. The obvious area would be the school library. Any system for storage requires that a classification system is used for storing and retrieving items. As the collection of educational media begins to grow. Unless there is a system of classification, cataloguing, storage and retrieval, the collection will quickly become chaotic and impractical.

Any large resource area needs various facilities:

Storage/Lending Area	Exhibition Area	Listening/Viewing Area
Administration Area		Studios
	Production/Workshop Area	Maintenance Area

EXERCISE 1

Study the cataloguing and storage system used in an educational institution. Write a brief report that describes briefly how the system operates including indexing, storage, retrieval, borrowing, returning, checking.

EXERCISE 2

Design a catalogue card, with a sample entry for a storage/retrieval system that would be useful in your own health training institution. Keep the card for future reference.

EXERCISE 3

As a group design a simple educational resource area appropriate for a health training institute. Discuss, before you start, what important features are necessary. Prepare a budget for this project (excluding the cost of buildings and salaries) and make an estimate of how much it would cost annually to maintain.

One of the teacher's most crucial tasks in the selection of the best combination of teaching resources and methods

Instructional resources such as handouts, overhead projectors, microfiche, tape slide, television and simulations of various types are tools in the teaching or learning process. Common objections to their use are that they are spoonfeeding and will replace the teacher, that their use is impersonal and dehumanizing, and that faculty/student contact will be lost. Appropriate application of these resources, however can increase the efficiency and effectiveness of teaching, may even increase student/teacher contact time, and may provide the teacher with more rewarding teaching experiences. The unique properties of learning resources which confer these advantages are:

UNIQUE PROPERTIES OF MEDIA RESOURCES

- 1) Media allow easy and repeated reproduction of an event or procedure.
- 2) Media can provide visual access to a process or technique which would be otherwise unobservable; and in addition can provide this access to large numbers of students simultaneously.
- 3) Media can provide a common framework of experience to large numbers of people in diverse situations.
- 4) Media can promote the illusion of reality, where reality is desirable but not possible to obtain.
- 5) Media facilitate individualized instruction which makes possible provision of different learning materials in the same content area, adapted for individual differences. Media also allow for students to proceed at their own pace and provide opportunities for active student involvement, for example, review questions and remedial exercises.
- 6) Media allow the artificial manipulation of time, space and perspective.
- 7) Visual media can facilitate the understanding of abstract concepts which may be difficult to communicate verbally.

CHOICE OF MEDIA RESOURCES

With rapid advances in technology the range of available learning resources is already vast and new products appear every day. Teachers who are faced with making choices frequently find themselves

¹ in Cox, K. and Ewan, C. The Medical Teacher, Churchill Livingstone, 1981
189 - 191.

ill-equipped for the task. Consequently, decisions involving the acquisition and use of media are often based on insufficient or irrelevant information. It might be helpful to consider the task of making a choice in terms of seeking satisfactory answers to a series of specific questions. Provided there is access to information which will answer those questions, the choice will become obvious.

The following questions can be used as a check-list. Brief guidelines are offered to assist in answering the questions:

1. Will your subject be enhanced by the use of learning resources?

Consideration of the unique properties of media listed above should provide guidance in answering this question. In addition it is advisable to remember that students are ultimately required to transfer their learning to real life situations. Therefore, if provision of real life situations in teaching is not possible, learning experiences which become progressively more similar to reality should be provided. For example, when the objectives of instruction require that the student will ultimately perform a surgical procedure, a colour videotape of that procedure will be less satisfactory than an opportunity to perform the procedure but more satisfactory than diagrams in a handout.

2. Is the learning resource appropriate to the learning task?

Judgements as to the relative benefits of certain attributes of media may be called for. For example, colour may be a more important feature of a unit of instruction in histology than is motion. If colour and definition are the most important aspects, then media using 35 mm slides will be as effective as 16 mm film, but will be cheaper and easier to produce, and therefore, since motion is unimportant, will be a more efficient and appropriate medium.

3. Are there sufficient interested teaching staff to use the new resources?

Acceptability of various media will determine their use and their effectiveness. Introduction of audio or videorecording for the purpose of developing interviewing skills, for example, may require a period of orientation and experimentation before its effectiveness will be evident. Failure to familiarize staff and students with the philosophy as well as the technology of media use may result in its misuse or rejection.

In addition, media should be the simplest available which are appropriate to the task. A self instructional program on the physiology of gas exchange will require the provision of a number of graphs and diagrams. A printed handout or booklet will be cheaper, and easier to produce than a tape slide since colour and realistic photographs are not required.

Simplicity of operation encourages the less adventurous teacher to 'give it a try' and decreases the risk of breakdown in the hands of inexperienced users. Simple equipment is also likely to be more economical to purchase and maintain. For example, if it is intended to make cassette recorders available to students for the purpose of listening to recorded

instruction, it will be sufficient to provide 'playback only' recorders which are cheaper and simpler than recorders with a "record" mode.

4. What resources are already being used, which of these are being effectively, and what problems have arisen in their use?

Thorough investigation of these questions will provide guidance in the choice of new media according to lessons learned from previous experiences.

An important consideration is the type of media used by other institutions who have similar needs and tasks and with whom you may wish to share learning materials. Incompatibility of media systems produced by various manufacturers is a major problem. A further important factor in the choice of media is the efficiency of available servicing. Before choosing among different brands of equipment, seek information about maintenance contracts with distributors. It is safer to choose equipment from distributors who have developed a good reputation for reliable service.

5. How much will it cost?

Choice of resources should never be based primarily on the money available. The most expensive equipment may be inappropriate for your needs and therefore less valuable than more appropriate inexpensive equipment. Colour video equipment, for example, is less useful to a school with little technical support than is black and white video equipment which may be used by any staff member with minimal training. Money saved on purchase of less expensive but more useful equipment may be used profitably to purchase or produce teaching materials.

Sophisticated equipment requires regular servicing to ensure maximum life. Are there technical staff available to maintain equipment in good working order? Consideration of cost of equipment should always include an allowance for recurrent maintenance costs.

6. Do you have access to sufficient instructional materials to make the purchase of particular media worthwhile?

If not, is there a desire and capacity for producing enough high quality materials?

In either case, choice of media may be influenced by the learning resources available or potentially available. For example, if it is intended to introduce self instructional teaching methods, purchase of self instructional media will be pointless unless they are supported by an adequate supply of self instructional materials.

SOFTWARE SELECTION

Most of this chapter has been concerned with the selection of the 'hardware' component of learning resources but what of the 'software', that is, the instructional materials?

Too often teaching institutions fall into the trap of buying as much hardware as their budget will allow without considering the source of the relevant software which will be used with it. Purchasing software produced in other institutions may prove very costly and it may be difficult to find materials which will satisfy the particular needs of the purchaser. Alternatively, the institution which invests in hardware should be prepared to provide both technical and educational support for the production and maintenance of teaching materials. The production of materials, or the review and appraisal of existing materials, is a necessary prerequisite to the effective use of any medium. Previous chapters in this section have outlined steps in the production of effective learning resources.

The following are guidelines for the selection of appropriate instructional materials to complement and identified teaching task:

- 1) Will the material help the students to learn what they need to learn?
- 2) Does the learning require the use of the material in order to be effective?
- 3) Is the material's level of instruction consistent with the student's level of ability and level of knowledge?
- 4) Are the concepts communicated accurately?
- 5) Is the material up to date?
- 6) Is the material presented in an interesting manner?
- 7) Does the material allow the students to actively participate in the learning?
- 8) Is the material of high technical quality?

SUMMARY

If you wish to use any of the resources described in this section a number of basic rules apply if you wish to avoid costly mistakes.

- 1) Discuss the needs with your staff and, if possible, students.
- 2) Determine which media others in your field are using.
- 3) Explore the options for media selection with someone who has had experience in the use of media.
- 4) Aim for flexibility in potential use of the media you choose.
- 5) Be guided by common sense and tend toward simplicity rather than complexity.
- 6) Consult technical experts whenever technical considerations influence your decisions.
- 7) Always ensure that the materials you choose are appropriate and well designed.

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UNIT FIVE

TEACHING PRACTICE

OBJECTIVES

To give the chance to teachers in training:

- * To demonstrate the planning and implementation of teaching skills acquired during the course.
- * To participate in all aspects of teaching functions in a training School for health personnel.
- * To develop skills in evaluating their own teaching.
- * To try out teaching approach previously not tried.

To achieve these objectives the student-teacher will:

- 1) Plan, implement and evaluate the effectiveness of a learning programme involves a minimum of 40 hours of student contact. This is expected to include Classroom, Clinical and Field visits, and teachers are expected to demonstrate familiarity with a variety of teaching methods.
- 2) Obtain feedback on the conduct of own individual teaching sessions from an observer/supervisor. This has a formative assessment function and should be completed as soon after a session as possible.
- 3) Participate in the administrative practices of the school, including timetabling, staff-student relationships, record systems, student accommodation and recreational facilities, student counselling, services and staff meetings.
- 4) Evaluate own performance and the experience as a whole.

ORGANISATION OF TEACHING PRACTICE EXPERIENCE

Firstly, this experience is meant to be both enjoyable and useful and these two categories are not actually exclusive. Throughout this experience try to put together a whole lot of things:

Your previous experience; your current understanding about educational practices and psychology; the microteaching skills you have acquired; the teaching methods that you now know about but are not always skilled at; your personal characteristics; your ability to assess performance.

Step 1. Visit to the School selected for teaching practice.

Step 2. Orientation.

See your head of department/school and discuss the whole experience, and the subject(s) you are going to teach. The more time spent in planning the better.

Step 3. Planning.

Try to plan your teaching practice as a "whole" experience. Develop a scheme of work that includes the objectives for your students, how you are going to achieve them, how you are going to measure whether they achieved them. Refer to both the objectives and the evaluation format for this experience from time to time.

Step 4. Implementation and Formative Assessment

Implement your teaching programme. A supervisor from the school will be assigned to occasionally observe your sessions to provide feedback on the enclosed forms. Discuss with this supervisor your performance as soon after the session as possible. If you want additional feedback, get your students to evaluate you.

Step 5. Analysis of Administration

During your attachment, observe the administration procedures and principles of the school. Educational administration is an integral part of a teacher's function, and it will help you to gain a greater insight into the whole educational process.

Step 6. Analysis

A supervisor from this programme will visit you, the purpose of this visit is primarily to discuss your scheme of work, how it is going and to discuss the dynamics of the educational administrative processes occurring in the school.

Step 7. Evaluation

Evaluating the experience. Ask the head of Department/Principal to complete the appropriate evaluation form. Also complete a self evaluation form. Bring these back with you at the end of the experience.

COMMENT ON TEACHING PRACTICE

The period of teaching practice is one of the most important for the student teacher as it gives an opportunity to practice the skills, methods and approaches introduced during the course. At the same time it is extremely difficult to provide adequate supervision and support from the course supervisors, and so heavy reliance is placed on the co-operating teachers in the schools where the student teachers are attached to provide the day to day assistance and feedback that is so necessary to make the experience a positive one.

Planning the Attachment

You will be asked to indicate a preference for the attachment school. However, the following factors are taken into consideration before assigning a teacher to a school:

- 1) Acceptance by the school to have a teacher on teaching practice.
- 2) Availability of suitable co-operating teachers.
- 3) Appropriate courses of study are available.
- 4) Students present and not just doing examinations.
- 5) Accessibility to college supervisors.
- 6) The department for attachment is not, where possible, the teacher's regular station.

Having been allocated to a particular school, the student makes a planning visit to discuss the syllabus, subjects to be taught, timetable, available learning resources and accomodation. On return to the college, the student develops a scheme of work, collects suitable resource materials and arranges to collect relevant allowances.

Attachment Period

The teacher undertakes a minimum period of 40 student contact hours, including clinical, fieldwork and classroom experiences. Feedback is obtained from the co-operating teacher. A supervisor from the college will visit at least once during the period. The teacher is also expected to take part in all administrative activities of the school, whether staff meetings, extracurricular events, invigilating examinations, library duties and so on.

Evaluation

The teacher is evaluated in a variety of ways:

- 1) *Evaluation by students*
Try to get feedback from the students you are teaching.
- 2) *Evaluation by the co-operating teacher*
This should be as frequently as possible.
- 3) *Evaluation by self*
Evaluate your own performance at the end of the experience. A report of not more than 2,000 words should be written evaluating the exercise.
- 4) *Evaluation by head#principal*
Ask the principal or head of department to complete the relevant evaluation format.

5) *Evaluation by College supervisor*
This is done as a summative exercise, using the collected information from the teacher, co-operative teacher, head, students report and own visit.

CLINICAL SUPERVISION OF STUDENT TEACHING

Jonathan Atwoki Rusoke¹

INTRODUCTION:

The importance of the "School Practice" component of the student-teacher's course has been emphasised, and maybe it is becoming over-emphasised. It is evident from the number of the frequent staff seminars devoted to the subject at the Faculty of Education, Makerere University, that there is need to continue discussing this very important aspect of teacher education.

Perhaps to re-emphasise its importance once again, an example will be drawn from the National Teachers' College, Kyambogo Course, which leads to the award of the Diploma in Education of Makerere University. The course at the N.T.C. lasts three academic years (usually beginning in May and ending in March).

Of these three years, three terms each year, only a small portion is spent on the school practice - it takes two halves of a full term that is, one half at the end of the second year and the other half at the end of the final year. The two practices are commonly referred to as the first and the final teaching practice. There is also a Primary School Attachment Programme/Child Study Course for the same period at the end of the first year. When the three year course ended at the end of 1976, the first school practice began taking place at the end of the first year.

Here it can be calculated that the school practice part of the student's course at the N.T.C. lasts one full term, which means that a student spends about 1/6 or about 17% of the course time on the school practice and about 83% of the course on theory or academic work. Both parts of the course are continuously assessed, but as can be seen from the above information, academic work is continuously assessed for a total of 96 weeks, yet for the school practice, only the final part is assessed, only 6 weeks. But the mark for the school practice assessment weighs half the final mark and the academic mark weighs the other half for the award of the Diploma. Thus, assessment mark for 96 weeks is equated with assessment for six weeks.

The above example is given, as pointed out earlier, to emphasise how important the school practice part is in the life of a student destined to become a teacher.

WHAT ARE THE OBJECTIVES OF THE SCHOOL PRACTICE?

J.C. Ssekamwa (1973) gives the following two points as mainly the purpose of the school practice.

- (a) To give a chance to training teachers to practice the teaching skills which they have learned mostly by theory at the training institute.
- (b) To see and participate in a real school situation under some deliberate supervision, before they are left on their own as full-fledged school masters.

¹ In P. Mutebi, Important aspects of practice and probationary teaching .
East African Literature Bureau - 1977 . 20 - 107

On the objectives of the school practice, J.W. Tibble (1971) states:

..... the value of the school practice derives fundamentally from its being the modern form of apprenticeship relationship which was embodied in the pupil - teacher system and in the practice schools of early colleges. It is indeed the only sound basis for the acquisition of practical skills.

As far as Tibble and others are concerned, the practical part of the student-teacher is his apprenticeship. This is compared with the earlier forms in the eighteenth and nineteenth century teacher training procedure where the student-teacher who was referred to as pupil-teacher so that he would eventually master the art of teaching. For the twentieth century, time and space do not allow for that long and slow process of training teachers. There are far too many numbers involved and the need for more teachers is ever pressing. Moreover, we cannot accept the concept of the master craftsman in the behavioural approach to the teacher-learning situation. Teaching is to be regarded as a science ".... behaving in a social context and is therefore amenable to scientific observation and analysis".

A detailed scientific study of the objectives of the school practice was carried out by Brimer and Cape at Bristol (1971). They presented ten different stated objectives to tutors of teacher' colleges, school teachers and student-teachers. Of the ten in question, according to the correlated responses, the following were chosen as the obvious objectives.

1. To provide the student with an opportunity of establishing an appropriate teacher - pupil relationship with children.
2. To provide the student with practical experience in schools which will reveal some of the problems of discipline and enable him to develop personal methods of control.
3. To provide the student with experience of success in the teaching situation so that he acquires confidence.
4. To provide an opportunity for the student to develop and display qualities of adaptability and sensitivity appropriate to the school situation.
5. To provide the student with opportunities for developing powers of observation.

The important main points which can be picked out of these five and the other five omitted objectives are to provide practical experience, improve teaching skills, learn the pupil - teacher relationships, and all in all, to bring about development of teaching skills in the student teacher.

From the above quoted authorities, it can be inferred that school practice forms one of the most important aspects of teacher education.

Having briefly discussed how important student-teaching is to the student in a teacher education institution, we ought to discuss the ways and means of supervising the student so that he can get a more meaningful experience out of the school practices. Different aspects of the supervision process have already been treated in previous chapters. The purpose of this chapter is to discuss how the supervisor goes about dealing with his client (the student under supervision). In other words, we are dealing with relationship between the supervisor/tutor and the student-teacher during the actual supervision. This is a very vital aspect of the student's school practice. Bad supervisory approach can ruin the prospects of a good student gaining a

distinction mark in teaching, and thus he has not really gained from the provided experience. This chapter presents a model of how supervisor/tutor should go about dealing with the student, how he should behave as a supervisor, in short, "clinical supervisor".

WHAT IS CLINICAL SUPERVISION?

Immediately one glances at the word 'clinical', one's mind races to that doctor's room in the clinic or hospital. One is not far from being correct. Perhaps, more is taken into consideration - a psychiatry case with a psychiatrist; something to do with treatment. But clinical supervising does not imply treatment, but just as the doctor deals with the patient, face to face, clinical supervision refers to the helping of the student by his supervisor/tutor, face to face, creating a relationship that 'cures' any fears that the student may have conceived. In other words, having a meaningful relationship between the student and his supervisor, that creates a learning situation so that the student steadily improves his teaching skills.

If we make an analogy of student-teacher/tutor relationship to carpenter/apprentice, the latter need not fear the expert carpenter, otherwise he will not learn. Supervisors should provide an opportunity where the student-teacher will gain self-sufficiency and freedom to act, so that he gains the autonomy he will need when he becomes a full-fledged teacher. The student-teacher should increase his initiative, incentive and drive for self-improvement from the experience of discussing with questioning and debating in understanding terms with the supervisor.

Stratemeyer and Lindsey have the following comments to make on clinical supervision:

..... We want, in each case, to be supportive and empathetic; to perfect technical behaviours and the concepts from which they are generated; to increase the efficiencies and pleasure of learning and of becoming; to treat one another decently and with affection, to engage in productive and rewarding encounters, and to move toward our own destinies and toward one another's honestly.

What are the characteristics of clinical supervision? It would be better to list them:

- (i) attention is paid to the teaching act and the performing of it.
- (ii) it is important that the supervisor is positive and dynamic.
- (iii) the supervisor is ready to share experience with the student-teacher rather than impose anything on him, in other words, authority should be in a way be set aside and there be a meeting of equals on equal plane.
- (iv) there is concern for the person, that is the student teacher and not just what he does.
- (v) both the supervisor and the student-teacher should be ready to learn from each other.

MODEL FOR CLINICAL SUPERVISION

There are various models of supervision; probably there are as many different supervision models as there are teacher education institutions. Goldhammer (1969) has a clinical model that he presents in five stages. This chapter will present one in three main stages. These stages are a series of conferences, namely (i) Pre-observation Conference (ii) Observation Conference (iii) Post-observation Conference.

Pre-Observation Conference

This stage of the supervision is of paramount importance, especially to the student-teacher. It sets the stage for the real supervision that will follow. First of all, it is meant to have the supervisor acquaint himself with the student-teacher, his planned lesson and his planned strategies of execution.

During this Conference, communication is established between supervisor and student-teacher and suspicions should be eradicated. For a meaningful pre-observation Conference to take place, two conditions are necessary:

- (i) the supervisor has to be as liberal, simple, co-operative and helpful as possible - no imposition of authority;
- (ii) the student-teacher has to be open-minded, ready to amend his planned lesson wherever he finds it necessary as he gains insight from the discussion with the supervisor, and feel more relaxed to learn more about the prepared lesson from his supervisor/Tutor. The student-teacher has to be completely relaxed in his mind and clear that the tutor is not tearing his lesson apart.

The pre-observation Conference creates fluency on the part of the student. By going through his lesson again for and with the supervisor, the student-teacher rehearses, revises and becomes more familiar with the content and planned strategy. However, it becomes completely shattered if the supervisor tears the whole lesson to pieces - indeed, he should avoid this. If the supervisor realises the lesson he is about to see will not make meaningful supervision, certain alternatives should be taken.

Either (i) the supervisor merely advises the student-teacher and does not go in to observe the lesson;

or (ii) the student-teacher is reassured that this is only assistance and not destructive criticism;

or (iii) the supervisor adopts an attitude where he does not blame the student, but is serious in helping him.

On the other hand, the student-teacher could have prepared his lesson when he was not sure either of the facts in the content or the new method he was trying out. The supervisor should be only too happy to welcome the idea of helping, guiding and correcting his client. This stage of supervision will either make the student-teacher more confident that he is going to teach a successful lesson or it will discourage him completely - it all depends on how the supervisor approaches the student-teacher and how the latter feels about his supervisor, and how much he wishes to avail to him for the help offered.

At this juncture, the reader is beginning to wonder about where one gets the time for all this fuss. The answer to this is "do little, but try to do it satisfactorily".

At the recent staff Group Seminars on teaching practice at the N.T.C., it was agreed upon by concensus that entering a student-teacher's classroom when he has started his lesson serves only to interrupt and even disrupt the lesson. It was, therefore, agreed that such a class would not be entered, the supervisor may explore the environment of the school, the physical facilities and location of other classrooms and science laboratories, and may be this is the opportunity to call on the headmaster.

Finally, at this stage, we might venture to use the term "Contract", though not mechanically. The supervisor should play no "hide-and-seek

games". The two of them (supervisor-student-teacher) should agree on what and how the teacher will carry out his task. (They may also agree to disagree - that is, if the student forces his way about a planned approach which the supervisor does not quite agree with, the tutor should be ready to learn from the student-teacher). He will have occasion to say it worked or "I told you it was difficult". But undoing the student's lesson completely is the beginning of mistrust, discomfort and discouragement. In short, during the pre-observation Conference, the supervisor has to summon his powers of patience and tolerance and he has to be as benevolent and empathetic as possible.

Observation Conference

This is the gist of the supervision activity. The supervisor sits in the classroom, watches, listens, interprets, follows, learns and records what is going on. He should write down what he sees and hears in as comprehensive form as possible. He should leave no chance where, during the discussion of the lesson, the student-teacher will say "I do not remember saying or doing that", or "surely that mistake was corrected as it happened".

The supervisor is collecting data which he will use, not to convict the student-teacher, but assist him and lead him to better ideas, during the discussion. It is an accepted fact that we sometimes learn from mistakes, the student should do so. When the teacher is engaged in the task of passing on information, organising the class, conducting written exercises, writing on the blackboard, he may not realise what he may be doing wrong. The supervisor sitting at the back of the class will be able to notice and note down these points. Goldhammer has this to say here:

..... if, in effect, tomorrow's problems and plans are structured upon false representations of reality, then the whole business will have been a terrible waste and will not be likely to result in anything better than disenchantment.

It is disenchantment that we must try to minimise or eradicate completely in any supervisory exercise and especially, in clinical supervision.

During the observation stage of the supervision, there are certain "dons" that every supervisor should remember - they are enumerated in the paragraph that follows.

- (i) It causes concern, if not disenchantment may even cause complete demoralisation on the part of the student-teacher if the supervisor interferes with or interrupts the student-teacher's procedure of the lesson; unless the student has called upon the supervisor for some information.
- (ii) The supervisor should not participate in pupil's activities where there are signs that he is taking over the part which should be played by the teacher.
- (iii) The supervisor should remain alert and move along with pupils and the teacher throughout the lesson - not dozing off for a time otherwise he will miss part of the lesson.
- (iv) He should not walk around the class during the actual teaching, this distracts the pupils. However, during the time pupils are doing written work or carrying out an experiment, then the supervisor may walk around to see that the right thing is being done, that the teacher's instructions are being followed and so forth.
- (v) He should avoid making any noise that may distract the pupil's attention - rustling papers, yawning, snoring, tapping shoes etc.

What are the most effective ways of recording the observed behaviour in the actual lesson?

If it was economically feasible, videotaping has been known to be the most effective. But to have one for every supervisor/tutor is impossible at our economic and technological stage of development. Moreover, the technical know-how and the time that videotaping involves is so great that it may be more of a hinderance than assistance. The other technological alternative is the tape-recorder. This may not reproduce the visual aspect of the progress of the lesson, but the audio contribution would be appreciated at the discussion time of the lesson. However, not many colleges of education would afford a tape-recorder for every supervisor either. In the absence of the new educational technology, one would have to resort to the most common, and sometimes abused method of recording data - that of writing it down.

There are some cautions that need to be taken about recording this data. All the points the supervisor intends to raise at the following conference must be recorded. The recording should be done as objectively as possible. Generalisations, which will lead to heated arguments must be avoided. The supervisor, for his own convenience, may devise his own shorthand which he can interpret sensible at the discussion time. Apparently, there is not much need to deal with obvious routine aspects of teaching - bulletin boards, dirty windows, physical posture etc. These can be pointed out to the student teacher and, it is hoped, in the beginning period of the school practice. The point here is that no valuable time may be wasted on trivials - we are more concerned with the teaching/learning behaviour.

Finally, it is suggested that the supervisor gets time, however short it may be, to analyse his points and lay down a strategy of approach to the on-coming discussion. He should record his points and trend of thoughts, consider which points should come first and which comes last, consider what psychological effects these points may have on the student-teacher. Again, the supervisor should carefully choose the time when to talk to the student-teacher, whether it is right to talk to him immediately after the lesson or much later.

This may bring about two problems, either the supervisor will not have had the time to plan his strategy, or the discussion may upset the student-teacher so much that he may not be comfortable enough to teach his next lesson. On the other hand, the supervisor may allow time to elapse so that the student-teacher may also have time to reflect over the lesson he has just taught.

Whatever the timing the supervisor may have or think fit to discuss the lesson, he should focus his considerations on the effects it will have on the student-teacher. But if the supervisor has done his job well at the pre-observation conference and he has laid his strategy for the discussion, there should not be any heartbreaks.

The supervisor should have techniques in systems analysis. While he observes the lesson being taught, he should have clear in his mind, the competencies which he is looking for to be fulfilled by the student-teacher.

The main points which would show evidence that the teacher is trying to achieve his objective properly and systematically, that the teacher is involving his pupils and causing them to learn, that the pupils are enjoying the activities they are acquiring new knowledge and applying it in the class situation. In order to do this effectively the supervisor should have a knowledge, however limited it may be, of interaction analysis.

He should be able to sense both the verbal and non-verbal behaviours of the teacher and of the pupils. He should also study the physical behaviours of the pupils and what the teacher does when odd behaviours occur. In other words, a good supervisor should study a systems analysis approach (such as Flanders IAS).

The supervisor should stay in the classroom from the start of the lesson to the end of it. The N.T.C. Staff all agreed that it is unfair to arrive when the lesson has begun or to leave before the lesson ends. All parts of the lesson are equally important and contribute to the teaching-learning interaction.

Post-Observation Conference:

This is a very important step in the supervision activity - it should not be omitted. In fact, there is more face-to-face dealing here between supervisor and student-teacher, it is here that the term "clinical" gets its root.

The purpose for this experience includes:

- a) so that the student-teacher may reflect on the lesson he has just taught - whether it went off the way he had planned it for or some points of it failed;
- b) so that there is an atmosphere of acceptable, support and understanding on both parties;
- c) so that the student-teacher may learn from any mistakes he might have made;
- d) so that the student-teacher should grow from strength to strength in his techniques of teaching as he is helped by his supervisor;
- e) it should serve as a reassurance if the student-teacher has been nervous and anxious.
- f) "..... Conference will at times require that you assume the role of leader and at other times you be in a cooperative participant You will participate or give leadership in Conferences that are both voluntary and scheduled"

Finally and most important, it is during the post-observation conference that future objectives for the student-teacher's lessons should be discussed. Both supervisor and student-teacher should learn from

each other in the post-observation conference. All the basic disagreements should be ironed out and the two parties should be set out to play for the new supervisory act where the mended weaknesses, it should be assumed, will not reappear - this is where the term "contract" appropriately comes in.

By now the reader must be saying to himself, "all this is idealism, it cannot be put into practice, surely we always follow a procedure more or less the same as described above, but the details are impossible to achieve". The writer agrees with you, but not all the way; in our teacher education approach, effective supervision has not yet been done. An illustration from the National Teachers' College's one teaching practice will support your ambivalence.

At the end of the teaching practice, it was calculated that a total of 65,766 miles had been travelled by 50 tutors and external examiners to view a total of 3,617 lessons. When further calculation is done, it is found that supervising any one lesson costs the supervisor 18 miles of travelling, it goes on to show that in order to give one assessment grade/mark to a final year student, the supervisor/examiner travelled about 40 miles on the average. Such an alarming picture raised the next question who should do the supervising?

COOPERATIVE OR MASTER TEACHER:

This approach has allegedly already been adopted by the Faculty of Education. Makerere University, and certainly many other institutions. It is a healthy move and one that should be encouraged to expand and grow. In the United States, in some, if not most, teacher education institutions, the regular tutors/professors need not supervise their students very much. In their context, there are specially qualified supervisors stationed in the areas, but most of the supervising is done by cooperating (master) teacher - the regular class teacher whom the student-teacher has replaced.

This writer has met with problems when he attempted to explore the possibility of cooperating teachers helping in the supervision of N.T.C. student-teachers. The following obstacles have been projected:

- a) The first persons approached are the Headteachers. Those say that they are so much absorbed in the administration of the school, they cannot find time to see student-teachers.
- b) The next persons turned to are the Heads of Departments (Subjects). Most often, these have no experience whatsoever, they are also struggling to settle in the teaching business.
- c) For the previous two teaching practices, our students have been going to schools and immediately assuming headships of their subjects.

The most appropriate and meaningful supervisor of the student-teacher would be the cooperating teacher. He has the time to sit in the student-teachers class, to discuss and guide the student-teacher and to render assistance whenever the student-teacher may need it. The next question may be: what experience does the regular teacher have?

One solution to this problem would be to hold some kind of seminars for such teachers. This writer has been involved in giving of refresher courses to teachers whose classes had been taken over by student-teachers at a Grade II Teachers' College. The teachers found the experience rewarding, they asked for more of it.

While our problem may be that of great distances involved, two suggestions can be made:

- a) Tutors travel to various area centres to give some kind of tutorial/seminar to the cooperating teachers.
- b) When the school staffing situation stabilises, we can narrow down the areas for the school practice exercises, say use Kampala, Jinja and Mbale/Tororo or Kampala, Masaka and Mbarara areas. That way it will be easy to collect the teachers in these respective areas and coach them. But cooperating teacher education is essential for effective supervision of student-teachers.

CONCLUSION:

Several issues have been raised in the chapter. Meaningful supervisory practice demands more time, patience and tolerance on the part of the supervisor. On the other hand, student-teachers have to be initiated in the practice of clinical supervision. Clinical supervision is a scientific approach to supervision of instruction. In this approach, we follow a sequence which makes a complete cycle: pre-observation, observation and post-observation conference. At the end of the post-observation conference, strategy is laid for the next supervisory activity. Throughout the supervisory sequence behaviour - interaction in the teaching-learning situation is the main focus of observation.

The writer accepts the fact that for the present time, it is not so easy to carry out effective clinical supervision with great distances involved and with shortages of personnel in the teacher education institutions as well as lack of experienced teachers for the purposes of cooperating teacher training. Here, a position is taken that the teacher, can be trained in supervision practice if certain conditions are fulfilled - reducing areas to be used and when the school staffing situation stabilises. Finally, the writer feels that clinical supervision is inevitable for fair supervision in teacher education and it is high time a start in that direction was made.

ASSESSMENT OF TEACHING BY CO-OPERATING TEACHER

Comments

AIMS		(Marks out of 40)
1. Clarity of aims.	The purposes of the lesson are clear	
2. Appropriateness of aims	They are appropriate and accepted by students	
PLANNING		(Marks out of 20)
3. Organization of	The individual parts of the lesson are clearly related to each other in an appropriate way. The total organization facilitates what is to be learned.	
4. Selection of content.	The content is appropriate for the aims of the lesson, the level of the class, and the teaching methods	
5. Selection of Materials	The specific instructional materials and human resources used are clearly related to the content of the lesson and selected method of instruction	
PERFORMANCE		(Marks out of 40)
6. Clarity of presentation	The content of the lesson is presented so that it is understandable to the students. Different points of view and specific illustrations are used when appropriate.	
7. Pacing of the lesson	The movement from one part of the lesson to the other is governed by students' achievement. The teacher stays with tempo accordingly	
8. Teacher-Student rapport.	The relationships between students and teachers are harmonious.	

cont. on next page

PERFORMANCE		(Marks out of 40)	
9. Variety of evaluation	The teacher devises and uses an adequate variety of procedures, both formal and informal		
10. Achievement of aims	The students have achieved the aim of the lesson, material is summarised and related to rest of curriculum.		
Total marks (%)			

Additional Comments:

Signature Date:

STUDENT ASSESSMENT OF TEACHING (Sample)

	Well	Adequate	Poor	Dont know
The teacher was able to:				
arouse my interest				
encourage participation of students				
explain clearly any new ideas				
simplify complex ideas				
relate issues to real world				
provide examples				
make me to think				
help where possible with confusions				
answer questions students raised				

My overall reaction to this session is:

positive

not sure

negative

TEACHER SELF-EVALUATION EXERCISE

<u>STATEMENT</u>	<u>RATING</u>			<u>ADDITIONAL COMMENT</u>
	seldom 1	average 2	often 3	Comments
1. I give my students opportunity to <u>practice</u> or apply knowledge in practical ways				
2. In my lectures I stop and draw thoughtful <u>feed-back</u> from my students regarding what I am saying				
3. I encourage my students to exercise their own initiatives (mental or practical) in mastering a subject.				
4. My daily teaching includes ways of " <u>rewarding</u> " good work.				
5. My assignments are such that the student can objectively <u>measure</u> his success in mastering them				
6. My emotional <u>relationships</u> with my students are relaxed and friendly and caring.				
7. My teaching includes the <u>connection</u> of my subject with other disciplines.				

Cont. on next page

	Seldom 1	Average 2	Often 3	Comments
8. My teaching includes <u>simulations</u> or role-playing				
9. My teaching includes <u>actual case studies</u> .				
10. I give my students a chance to <u>measure</u> their progress half way into a course				
11. I give students a chance to show what they do <u>not</u> know, without shaming themselves.				
12. My teaching includes clear, simple relevant <u>audio-visual</u> aids.				
13. My course <u>content</u> is <u>relevant</u> to the job the student will actually be expected to do in the field.				
14. My course includes relevant interestingly presented <u>"on-the-job"</u> visits.				
15. I <u>change</u> my course content to fit changing circumstances.				

cont. on next page.

	Seldom 1	Average 2	Often 3	Comments
16. I take time to explain a student's error to him.				
17. I give practical <u>examples</u> of my points.				
18. I make <u>allowance</u> for individual students' differing aptitudes and pace of work.				
19. My lessons are carefully <u>planned</u> and <u>prepared</u> .				
OVERALL SCORE				Totals

REPORT

You should also write a report, not longer than 2000 words, evaluating this experience. This should be turned in immediately on return from the experience.

TEACHER EVALUATION QUESTIONNAIRE

To be completed by the head of department to which the tutor is attached for teaching practice. Please try to consider each attribute of teaching separately rather than allowing an overall judgement of the tutor to be selected in each response. Circle whichever response seems to most closely represent the behaviour observed by you during the period of teaching practice.

NAME OF TUTOR

1. Planning of teaching is

- A. thorough and systematic
- B. usually thorough
- C. disorganised

2. Seemed to have prepared presentations carefully

- A. Always
- B. Almost always
- C. Usually
- D. Occasionally

3. Stimulates the interest of students

- A. to a high degree
- B. moderately
- C. little
- D. destroys interest

4. Attitudes towards students

- A. almost always helpful and patient
- B. usually helpful and patient
- C. often indifferent or impatient
- D. hostile

5. Places responsibility for learning on the student.

- A. completely
- B. regularly
- C. occasionally
- D. Spoon-feeds students

6. Ethusiasm for teaching.

- A. high
- B. moderate
- C. low
- D. unenthusiastic

7. Attitudes towards innovations in teaching.

- A. always willing to try different teaching methods.
- B. sometimes tries out different teaching methods.
- C. always sticks to one or two teaching methods.

8. Attitude towards attachment

- A. made full use of the time available
- B. did only the teaching demanded of him/her
- C. made little use of the time available to improve skills

9. Grasp of subject matter

- A. seems to be well-read in his/her field
- B. knowledge of subject matter is only adequate
- C. insufficient knowledge of subjects taught

10. Attitude to other staff

- A. positive
- B. indifferent
- C. negative

11. The tutors overall effectiveness in this experience seemed

- A. excellent
- B. good
- C. fair
- D. poor
- E. very poor

Any other comments:

Signature: _____ Date: _____

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U N I T S I X

T E A C H E R S G U I D E

AIM OF THE EXPERIENCE.

The overall aim of this experience is to 'break' the habits and 'set' of the in-service teachers. Most research supports this approach theoretically, and our experience has supported it also. It successfully starts the process of in-service teachers looking at teaching from outside themselves, and it seems to be a necessary first step prior to changing established behaviour.

HOW MUCH TRAINING TIME IS NEEDED?

Very little. We have found that Flanders system is sufficiently complicated and yet clearly set out, that mastery of that system is adequate to cope with any other system that comes along. Experience has shown the following sequence to be useful:

1. Introduce the concept and rationale for IAS.
2. Students read introductory material and FIAS.
3. Clarify any points in following discussion.
4. Practice observing. Divide the group into two. One group act as students, or alternatively use an audiotape. The other group act as observers. One student taps out the time interval of three seconds. This should last for approximately 3 minutes and there will be complete chaos. Now alternate the groups and try for another 3 minutes. Record some of these where all students can see them and compare the observations. They will be completely different and two problems will have come up (1) observers do not observe fast enough.
(2) inaccurate classification of behaviour at this point, go through the ground rules about observations again (pp 15 - 17). Now do another longer practice period e.g. (5 minutes) and most people will be recording well by that time.

WHERE SHOULD OBSERVATIONS BE DONE?

Allow students to select where they would like to observe, but observations in at least 3 different kinds of institutions help each student to really get to grips with the whole exercise.

Suggested institutions are:

- a) Nursery schools,
- b) Primary schools,
- c) Medical training centres,
- d) Secondary schools

- e) Teacher training colleges,
- f) Higher education institutions (Egerton, Polytechnic, etc)
- g) Special schools (Jacaranda etc).
- h) Village polytechnics.

Students can arrange specific schools and times for observation with heads of schools or departments. Note that access to government institutions can be difficult but a letter to the Provincial Education or Higher Education Officer is usually enough for permission to be granted. A preliminary letter to the institution is appreciated, as well as a letter of thanks, enclosing a summary report, all helps to keep institutions positive in their participation in the exercise.

RESOURCE MATERIAL

The manual contains basic instructional material which needs supplementation from other material. Try to put reading matter on reserve in the libraries - it gets students used to using reserve collections, as well as efficiently using limited resources.

NUMBER OF OBSERVATIONS

We have stipulated a minimum of eight observations, but many students will do more. Eight seems to be the point at which enough data forces the student to analyse fairly critically, without turning the exercise into a major research project.

Many more (20) observations would require the students to spend more time over the exercise with decreasing marginal utility. This 8 - 20 observations would seem to be an optimal standard to achieve the objectives.

EVALUATION OF THE EXPERIENCE

No evaluation format has been included, but some evaluation either structured or unstructured is necessary. While a written evaluation can be useful, we have found that since the experience is not directly comparable for each student, since they go to different places at different times and with different frequency, a written evaluation has limited value. This is mainly an affective experience and needs to be evaluated as such.

TABLE 1:

SUMMARY SCHEDULE OF RECOMMENDED ACTIVITIES

ACTIVITY	MATERIAL	PERIOD
1. Introduction to AIS.	Manual	1 hr.
2. Students reading/discussion	Manual	3 hrs.
3. Practice Observation (FIAS)	Manual Tape or Model teacher Time-keeper	1 $\frac{1}{2}$ hrs
4. Planning of observations	Introductory letter	2 days
5. Observations in educational institutions	Manual	1 week
6. Discussion & analysis of results in small peer groups	Observation data	1 day
7. Compiling report	Data & Manual	1 day
8. Discussion of results/ evaluation of experience	Manual All reports Evaluation format	1 $\frac{1}{2}$ day
Total period needed 2 weeks (minimum)		

TEACHERS GUIDE TO UNIT TWO

GUIDE FOR TEACHERS SUPERVISING DURING MICROTEACHING

PREPARE YOURSELF

Although the exercises are already prepared for you, try to read through the programme before you go to meet your group. As you have had experience of the programme you can anticipate where students are likely to encounter problems, and prepare material or ideas to help them.

GIVE ENOUGH TIME FOR EVALUATION

There is a temptation to let students teach beyond their allotted micro-lesson time. Inevitably, this leads to less time available for evaluating their performance. So simply keep to the stated times in the manual.

GIVE CRITICAL PRESCRIPTIVE FEEDBACK.

Quality of feedback.

You will find generally that the peer group feedback to the student teacher is unrealistic. This is partly because they are often not really clear about the skill, but also they are reluctant to put pressure on their colleagues, as their time will come around soon. Your role then is to pick up faults and provide constructive and clear feedback immediately after performance of a skill. Delayed feedback in this situation is worse than useless, and the peer group learn from you how to give adequate and helpful feedback! Teachers will benefit more from critical but prescriptive feedback than they do from vaguely positive feedback.

USE OF GRADUATES FROM PROGRAMME AS TUTORS

Due to the shortage of permanent staff in the programme, and also tutors who are familiar with microteaching, we have been using graduates of the programme as group tutors. This has proved to be a valuable experience all round and can be successfully implemented. A good briefing and provision of some support is all that is necessary to start the unit.

EQUIPMENT

Students should be issued with a C60 cassette tape for their own use during the period, and returned at the end of the experience.

Tape recorders and model tapes should be kept easily accessible, but their use monitored. There will be heavy use on the equipment and care should be taken to keep recording heads clean, and any faults notified promptly.

GROUPING THE STUDENTS

The group should have between 5 - 7 members, and be heterogenous in composition.

T E A C H E R S G U I D E T O U N I T T H R E E

Most of the comments made about Unit Two are applicable directly to Unit Three. The unit is difficult to manage over a short period and enough time should be given to it to ensure that every student gets an opportunity to try out every teaching method.

This unit needs to be followed up during teaching practice, otherwise students will tend to revert to their basic 'survival' skills unless encouraged even required to try out the new methods in the real teaching situation.

There are three main areas of emphasis in this unit - the effective use of teaching aids while teaching; the ability of teachers to operate equipment; and to locate or design the actual teaching aids. This requires attention to two things - that teachers get hands on experience of the equipment, and that they have the opportunity to teach using various teaching aids.

A team teaching approach has been used successfully in this unit with each resource person teaching one area of speciality. Another way to organise it can be in small groups of 5 - 7 students, who work through the skills together.

Provision of software needs to be arranged in advance. Materials needed are:

- manilla paper
- butcher paper
- scrap paper
- pencils
- audio cassettes
- films (photographic)
- felt pens
- paint brushes
- paints (water colours)
- letra set
- overhead transparencies or exposed X-ray films
- glue
- old magazines

Other more permanent materials needed are:

- scissors
- razor blades
- rulers
- set squares
- lettering guides

A semi permanent working area is needed for continual access by trainers that meets the following functions:

- for design and preparation of A/V aids.
- for self instruction/study of equipment
- for splicing editing tapes and films
- for display of materials
- for storage of materials needed.

Visits to resource centres in other more developed institutions can be valuable. Currently useful centres are Agricultural Information Centre, Kenya Technical Teachers' College

T E A C H E R S G U I D E T O U N I T F I V E

The key to this unit lies in:

- (1) Matching the student to a suitable attachment area
- (2) Good supervision
- (3) Sufficient time to practice

A checklist you should follow is:

- (1) Identify attachment places for the period of teaching practice
check whether:
 - they have students for the period
 - there are suitable co-operating teachers;
 - the general atmosphere of the school is accepting and is positive towards the experience.
- (2) Allow students to select which school they want to go to.
Avoid sending students to:
 - their immediate former station;
 - a school where they will not have access to clinical areas or subjects they can teach.
 - schools where daily supervision will not be good enough.
- (3) Confirm with the schools who to expect and for what period.
- (4) Send students for a preliminary visit to arrange scheme of work, timetable and accommodation.
- (5) Make arrangements for imprest allowances to be drawn.
- (6) Plan the supervision schedule for all students, and give everybody copies.
- (7) Have extra copies made of the assessment schedules for co-operating teachers so that each student has enough copies for the experience.

